METAL INDUSTRY

ELECTRO-PLATERS REVIEW
BRASS FOUNDER AND FINISHER
COPPER AND BRASS
ALUMINUM WORLD

VOL. 34 NEW YORK, APRIL, 1936 No. 4

Foundrymen Will Meet in Detroit

Annual Meeting of the American Foundrymen's Association Will Show All Phases of Practical Foundry Operations and Equipment.

By F. J. HUNTLEY
Detroit, Mich.

AN OUTSTANDING feature of the 40th annual convention of the American Foundrymen's Association, which opens in Convention Hall, Detroit, on May 4 to continue until May 9, will be the opportunity to learn of, and witness in actual operation, the most advanced methods, machinery and equipment to be found anywhere in the world.

It should be understood that Detroit foundrymen, and particularly those engaged in motor car production, are versatile individuals and when faced with problems, proceed to work them out in their own way. For this reason Detroit has so much of interest that will be available for inspection by more than 10,000 visitors who are expected to attend the great gathering. This was all under consideration when Detroit was selected as the 1936 convention city. Furthermore Metropolitan Detroit is a revived and rejuvenated industrial area with the old depression period well in the background.

Detroit foundrymen, with some of the largest plants in the world, like others, received a tremendous blow in the midwinter of 1933. With banks crashing everywhere, and particularly in Detroit, where for days at one time it was impossible to get even a small check cashed, production sagged almost to the vanishing point. Then later, started the slow recovery with the keenest sort of competition accompanied by problems that seemed at the time beyond solution. Machinery and equipment became obsolete almost overnight and it probably is no exaggeration to say much the same conditions are prevailing today.

New methods and new foundry equipment are coming to the front almost continuously with most of them being developed right here in Detroit.

Necessity for these advances may be traced directly to the motor car industry which is constantly demanding improved quality, more rapid production and low costs. This is the reason why better motor cars are

being built today than ever before, and at prices far below those in the earlier years of the industry. Apparently this is a condition that is sure to continue down through the years.

In order to meet these requirements and to show a profit at the end of the year it is necessary for the foundrymen to know just what is being developed in their particular field. It is their only salvation for the future. They will have an earful and an eyeful after going through this 1936 convention here in Detroit.

Detroit's Foundries

The representative of the **Metal Industry** had many interesting talks with leading foundrymen. Invariably he was impressed with the fact that the successful foundryman should be at least one jump ahead when it comes to machinery, equipment and methods of operation. If he can keep two jumps ahead, so much the better.

Take the **Ford Company** for instance, which has in operation the largest foundry to be found anywhere in the world. New equipment is going in almost constantly and the old being junked at the same rate. They are facing vital problems every month in the year. But these do not slow them up or cause any great amount of anxiety. They handle this foundry problem the same as all their others pertaining to production, working them out right in their own laboratory and plant. Skilled technicians and skilled mechanics are constantly busy on new machinery needs and methods. The new machinery is built right in the plant where it can be supervised to meet its particular requirements.

This foundry will be open for inspection by visitors who are expected here the first week in May.

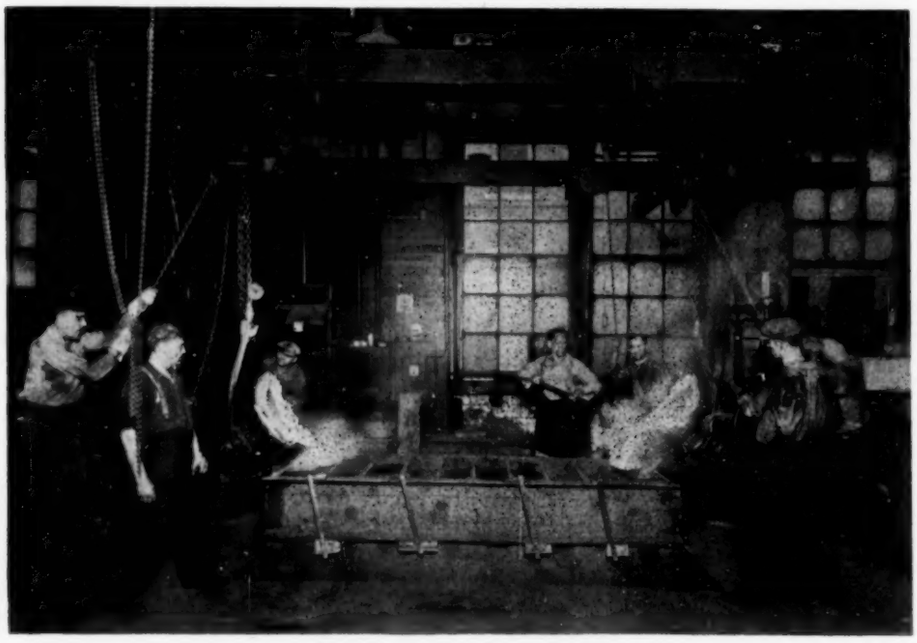
The foundry industry of the **General Motors Corporation**, whose headquarters also are in Detroit, is not so concentrated as that of the Ford organization. The General Motors has plants in a number of adjacent cities, particularly out in the state. It seems as if these individual places so far as refinements and substitution of equipment are concerned, are almost in a continuous state of evolution, striving for speed and better castings at lower costs, and the engineers are doing great work in meeting these demands. Notably is this true at the **Cadillac Motor Car Company's** plant where one of the General Motors largest foundries is operating at top speed under most favorable circumstances so far as machinery and equipment are concerned.

Then there is the **Chrysler** plant where another high-speed and efficient foundry is operated. Individual problems are worked out there with the same efficiency and originality as at the other motor car plants. Then the Dodge foundry and the Packard foundry, where the precision methods are followed concerning new machinery and equipment. Frequent changes are almost constantly in order to meet with new problems and demands.

In the Detroit area also is located the **Bohn Aluminum and Brass Corporation,** operating one of the largest plants of its kind to be found anywhere in the United States. While this concern is engaged extensively in the production of motor car parts, it also has a wide range of other products where aluminum and non-ferrous metals are concerned. Tons and tons of castings are turned out daily, not only for the automotive industry, but for airplanes, refrigeration units, motor boats, and other miscellaneous requirements. It should be remembered the Bohn organization is always ready to undertake any kind of production where non-ferrous metals are concerned.

One of the outstanding foundries of the smaller organizations is that of the **City Pattern Works** at 1161 Harper Avenue, under the direction of **Vaughan Reid**, president. **Fred J. Coulton** is secretary and treasurer. The foundry in this plant is as efficient as can be found anywhere in the Detroit area. Mr. Reid, in conversation with a representative of the **Metal Industry** the other day, said that just as quickly as he finds that a piece of equipment should be replaced by something better he junks it at once. In this way he is able to meet efficiently any production problem that arises from time to time. And he was emphatic in declaring that under the new order of things of the present day, there seems to be no end of foundry problems that have to be solved promptly and with certainty.

Mr. Reid specializes in brass, bronze and aluminum castings and copper castings of the highest conduc-



Foundry of the City Pattern Works, Detroit, Mich.

tivity. This plant of late has been producing Mallory 3 metal, an alloy consisting pre-dominately of copper. (See **Metal Industry** for February, 1936, p. 72). The accompanying photograph shows the interior of City Pattern Works foundry where workmen are pouring this metal.

It should be remembered the motor car industry extends over a wide range in the southern Michigan peninsula and also eastward into the state of Ohio.

J. L. WICK, JR.
Incoming
President,
American
Foundrymen's
Association

Pontiac is only 25 miles north of Detroit which may easily be reached by the visiting foundrymen. Here they will find extensive plants operated by the **General Motors Corporation.** Northward 25 miles further on is the city of Flint, the seat of the great **Buick Motor** organization and branch plants of the **Fisher Body Company.** There is another fine General Motors foundry at Saginaw 110 miles north of Detroit. Lansing, the State Capitol, is where the Oldsmobile is made. Its castings are obtained from Flint.

With such a great number of foundries striving for quality production, there certainly is no mistaking the fact that Detroit and all this middle-west industrial area, is the center where technical progress in foundry expansion is constantly bringing into existence new methods, new equipment and new machinery, with an ever increasing expansion of refinements in casting production.

Convention Arrangements

Convention Hall, where the convention will be held, is located a short distance outside what is known in Detroit as the "Loop District." It may be reached in five or six minutes by cab from any downtown hotel. It is well arranged for showing the great array of exhibits, many of them to be in full operation, which are expected to cover approximately 166,000 square feet of floor space.

It should also be remembered there will be plenty of entertainment outside the educational program. Special features have been arranged for the ladies who are expected to be present in considerable numbers.

General Chairman of the arrangements committee is **Vaughan Reid,** President of the City Pattern Works. **Fred Erb,** President of the Eaton Erb Foundry Company, Detroit, is Chairman of the Plant Visitation Committee; **W. H. J. Cluff,** President of Frederic B. Stevens, Inc., is Chairman of the Transportation Committee; **Hugh Martin,** President of the Grey Iron Foundry Company is Chairman of the Publicity Committee; **William B. Crawford,** President, Atlas Foundry Company, Detroit, Chairman of the Golf Committee; **W. J. Muhlitner,** Vice-President, Great Lakes Foundry Sand Company, Detroit, Chairman of the Stag Dinner Committee; **F. J. Walls,** International Nickel Company, New York, Chairman of the Annual Banquet Committee; **Harry Deutsch,** Superintendent, Aluminum Company of America, plant, Detroit, Chairman of the Hotel Committee; **S. W. Utley,** President, Detroit Steel Castings Company, Detroit, Chairman, Reception Committee.

Plans for the Program

The Program Committee of the American Foundrymen's Association announces a very interesting and valuable series of sessions. The list of sessions, shown in the accompanying schedule, presents a balanced program of interest to the executive, production, and metallurgical branches of the industry. Papers to be presented will deal with malleable iron, non-ferrous, steel and cast iron problems, and with general interest topics, such as safety and hygiene, apprentice training, sand control, and refractories.

While registration and plant visitation activities will begin on Monday, May 4, the exhibition will open Tuesday, May 5, and the formal opening of the convention will take place on that same morning, at which time **Harvey Campbell,** Secretary of the Detroit Chamber of Commerce, will welcome the members of the A.F.A. and their guests to Detroit.

The outstanding session of interest to the foundry executive will be the Symposium on **"Progress of Engineering, Medical and Legislative Aspects of Safety and Hygiene in the Foundry Industry."** This session is sponsored by the recently formed Safety and Hygiene Section of the A.F.A., of which **E. O. Jones** is Director.

Sessions of general interest to all groups of foundries will be those on sand research and control, refractories, and apprentice training.

The session on foundry refractories is to be one in a series which will bring to the attention of foundrymen some of the many problems which are of impor-

JEROME
STRAUSS,
Chairman,
Non-Ferrous
Division,
A.F.A.

tance, yet which have been neglected to a considerable extent. Papers will be presented on foundry refractories in general, on their behavior in cupolas, and on those used for insulated ladles. The committee is planning to devote a part of this session to a discussion of current questions which are presented by those in attendance. The committee in charge of this meeting consists of **C. E. Bales,** Iron-

ton Fire Brick Co., Ironton, Ohio, Chairman, **A. H. Dierker,** Ohio State University, Columbus, Ohio, and **John Lowe,** Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

Shop Operation Courses

Because of the large number of shop men who will be in attendance, unusual attention is expected to be directed to the two shop courses planned this year.

Practical Sand Control

The Sand Shop Course sessions will present for discussion some of the very practical and fundamental aspects of sand control for review and discussion. These sessions are essentially different from the more formal meetings on sand research. They are designed to show the shop operator how sand control may be installed to obtain practical benefits and opportunity is given for presentation of questions from the floor pertaining to some of the more every-day problems involved. The committee sponsoring these sand control sessions is composed of **W. H. Spencer,** Sealed Power Corp., Muskegon, Mich., chairman, **Chas. Schofield,** Gray Iron Foundry Div., Chevrolet Motor Co., Saginaw, Mich., and **Donald Yost,** Budd Wheel Co., Detroit.

Apprentice Training

The Apprentice Training Committee is continuing its plan of calling attention to the need for organized training of foundry apprentices and its session for the Detroit meeting will be unusually timely in view of the present shortage of skilled men in the foundry industry. **H. W. Boulton,** Murray Corporation, Detroit, will outline the plan being carried out in Detroit under the sponsorship of the Employers Association of Detroit. **Franklin R. Hoadley,** Farrel-Birmingham Co., Ansonia, Conn., will present a discussion of the successful operation of the training program used by his organization.

The Apprentice Committee will also have a display booth in the exhibit. Castings and patterns which have been entered in a national competition by apprentices from various plants throughout the country will be shown. A committee of judges will select the patterns and castings for awards in steel and iron molding and pattern making groups. Cash prizes have been provided by the Awards Board of the A.F.A.

Nonferrous Foundry Practice

The Nonferrous Division presents two sessions at which papers on foundry practice pertaining to special alloys will be discussed. The papers this year will deal with silicon bronze, aluminum bronze, and manganese bronze, combining both shop practice data and alloy properties. In addition, the Recommended Practice Committee expects to have ready for discussion three or four practices which are being added to the series which will later be published in a handbook on nonferrous alloys. These papers and reports will provide an unusually valuable program for the nonferrous foundryman.

The Nonferrous Round Table conference is being organized by a committee, the chairman of which is **T. C. Watts,** Falcon Bronze Company, Youngstown, Ohio. The other members are **Harold J. Roast,** Canadian Bronze Company, Montreal, Canada, and **H. J. Rowe,** Aluminum Company of America, Cleveland. This committee is planning some special features to make the round table meeting different from those which have preceded. This will be a dinner meeting to be held the evening of May 6.

Program of Meetings

Monday, May 4

Registration—Convention Hall
Plant Visitation

Tuesday, May 5

9:00 A.M. Exhibits Open—Close at 6:00 P.M.
9:00 A.M. Cast Iron Shop Course (Session 1)
10:00 A.M. Formal Opening Meeting—Fortieth Annual Convention
11:00 A.M. (a) Nonferrous Casting Practice
(b) Malleable Cast Iron
2:00 P.M. Sand Research
4:00 P.M. Sand Control Shop Course (Session 1)
7:00 P.M. Joint A.F.A., F.E.M.A. and Detroit Chapter of A.F.A. Dinner, Smoker and Entertainment

Wednesday, May 6

9:00 A.M. Exhibits Open—Close at 6:00 P.M.
9:00 A.M. Cast Iron Shop Course, (Session 2)
10:00 A.M. (a) Cast Iron
(b) Malleable Cast Iron Foundry Sand Control
12:30 P.M. Engineering Instructors Luncheon
4:00 P.M. Sand Control Shop Course (Session 2)
7:00 P.M. Dinner and Round Table Discussion —Nonferrous Division
8:00 P.M. (a) Foundry Refractories
(b) Apprentice Training

Thursday, May 7

9:00 A.M. Exhibits Open—Close at 6:00 P.M.
9:00 A.M. Cast Iron Shop Course (Session 3)
10:00 A.M. (a) Cast Iron Metallurgy
(b) Nonferrous Castings
12:30 P.M. (a) Steel Foundry Round Table Luncheon
(b) Malleable Round Table Luncheon
4:00 P.M. (a) Sand Control Shop Course (Session 3)
(b) Annual Business Meeting
7:00 P.M. Annual A.F.A. Dinner

Friday, May 8

9:00 A.M. Exhibits Open—Close at 6:00 P.M.
9:00 A.M. Cast Iron Shop Course (Session 4)
10:00 A.M. (a) Steel Founding
(b) Cast Iron (Alloy Cast Iron Symposium)
2:30 P.M. Symposium on Progress of Engineering, Medical and Legislative Aspects of Safety and Hygiene in the Foundry Industry
4:00 P.M. Sand Shop Course (Session 4)

Saturday, May 9

Exhibits—9:00 A.M. to 4:00 P. M.
Detroit Day

Recommended Practice for Common Aluminum-Copper Alloys

A Report of Non-Ferrous Division Committee on Recommended Practice of the American Foundrymen's Association, Presented at the Meeting in Toronto, Canada, August 20-23, 1935.—Part 5. Conclusion.*

E. RECOMMENDED PRACTICE FOR THE HEAT TREATED ALUMINUM-SILICON ALLOYS[24]

1. Chemical Control Limits.

The tensile and yield strengths and hardness of the aluminum-silicon alloys increase with copper and magnesium content. The addition of these elements much beyond the specified limits results in excessive brittleness. Iron is exceptionally harmful with respect to elongation and should be maintained as low as possible.

The lower copper and magnesium of alloy B-42, together with an increase in silicon over alloy B-41, reduces the tensile strength somewhat but improves the ductility. Alloy B-42 possesses excellent corrosion resistance.

The addition of nickel and manganese, although reducing the ductility of alloy B-43 at room temperatures, materially improves the mechanical properties at elevated temperatures.

Alloy	Cu.	Iron	Si.	Mg.	Mn.	Ni.	Other Elements
B-41 HT1	1.0-1.5	0.5 max.	4.50-5.50	0.40-0.60	....	....	Total others 0.30% max.
B-41 HT2	"	"	"	"	....	....	
B-41 HT3	"	"	"	"	....	....	
B-42 HT1	0.20 max.	0.5 max.	6.50-7.50	0.20-0.40	....	....	Total others 0.20%
B-42 HT2	"	"	"	"	....	....	
B-43 HT1	1.2-1.75	0.6 max.	4.50-5.50	0.40-0.60	0.60-1.00	0.60-1.00	Total others 0.20%
B-43 HT2	"	"	"	"	"	"	

2. Physical Properties of Sand Castings.

	Alloy B-41 HT1	Alloy B-41 HT2	Alloy B-41 HT3	Alloy B-42 HT1	Alloy B-42 HT2	Alloy B-43 HT1	Alloy B-43 HT2
Ultimate Tensile Strength, Lb. per sq. in. (Min. to Avg.)[25]	27000-30000	32000-36000	25000-27000	26000-29000	30000-33000	25000-28000	23000-26000
Yield Strength, Lb. per sq. in. (Permanent Set = 0.2%) (Avg.)	20000	27000	23000	16000	22000	24000	21000
Modulus of Elasticity, Lb. per sq. in. X 10^6 (Approx.)	10	10	10	10	10	10	10
Elongation, Percent in 2 in. (Min. to Avg.)	4.0-5.0	2.0-3.0	1.0-2.0	5.0-7.0	3.0-5.0	1.0-2.0	1.0-2.0
Brinnell Hardness (10 mm ball, 500 Kg Load) (Approx.)	60	80	60	5	70	60	55
Ultimate Compressive Strength, Lb. per sq. in. (Approx.)[26]	65000	68000	....	46000	48000	....	....
Specific Gravity (Approx.)	2.67	2.67	2.67	2.63	2.63	2.74	2.74
Weight per cu. in. (Lbs.) (Approx.)	0.096	0.096	0.096	0.095	0.095	0.099	0.099
Pattern Maker's Shrinkage, inches per foot	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32
Solidification Range—°F (Approx.)	1160-1075	1160-1075	1160-1075	1130-1075	1130-1075	....	....
Electrical Conducivity (Percent of annealed copper standard at 20°C) (Approx.)	35	37	38	...	....	....	....
Endurance Limit, Lb. per sq. in. (R. R Moore Machine 500,000,000 reversals)	....	7000	....	....	8000	7000	7000
Coefficient of Thermal Expansion per °F X 10^{-6} (Approx.) 68-212°F	12.2	12.2	12.2	11.9	11.9	11.9	11.9
68-572°F	13.3	13.3	13.3	13.0	13.0	12.7	12.7

*Parts 1, 2, 3 and 4 were published in our issues for November and December, 1935, January and March, 1936.

[24] U. S. Patents 1,508,566; 1,572,488; 1,595,058; 1,848,816; 1,908,823.

[25] Tension values determined from standard ½ in. diameter A.S.T.M. separately cast test specimens.

[26] Results of tests on specimens having 1/r ratio of 20. All specimens failed by lateral bending.

3. Conforming Specifications.

Alloy		
B-41 HT1	Aluminum Company of America	No. 355-T4 Alloy
	Society of Automotive Engineers	No. 222-HT1 Alloy
	U. S. Navy Department	M-212a Class 10 HT2[27]
B-41 HT2	Aluminum Company of America	No. 355-T6 Alloy
	Society of Automotive Engineers	No. 322-HT2 Alloy
	U. S. Army Ordnance Department	No. 11307
	U. S. Navy Department	M-212a Class 10 HT3*
B-41 HT3	Aluminum Company of America	No. 355-T51 Alloy
	U. S. Navy Department	M-212a Class 10 ET4*
B-42 HT1	Aluminum Company of America	No. 356-T4 Alloy
	Society of Automotive Engineers	No. 323-HT1 Alloy
	U. S. Navy Department	No. 46A1c Class 3
B-42 HT2	Aluminum Company of America	No. 356-T6 Alloy
	Society of Automotive Engineers	No. 323-HT2 Alloy
	U. S. Army Ordnance Department	No. 11308
B-43 HT1	Aluminum Company of America	No. A355-T51 Alloy
	U. S. Navy Department	M-212a Class 11 HT3*
B-43 HT2	Aluminum Company of America	No. A355-T59 Alloy
	U. S. Navy Department	M-212a Class 11 HT2*

[27]Tentative.

4. Development.

The heat treatable aluminum silicon alloys were developed to combine the excellent casting characteristics of this type of alloy with the improved mechanical properties resulting from heat treatment, the benefits of which are so evident through the use of heat treated aluminum-copper alloys. The silicon alloys are much easier to cast than the latter alloys and at the same time have comparable mechanical properties.

The aluminum-silicon alloys because of their fluidity are especially adapted for intricate castings with thin sections. In addition to this they are not "hot short" and are generally quite leak proof. This group of alloys is more resistant to corrosion than the aluminum-copper alloys. They also possess good machineability and are among the best for electroplating and anodizing.

5. Field of Use.

The heat treatable aluminum-silicon alloys are finding application in ever widening fields, displacing aluminum-copper alloys largely because of their superior casting characteristics and resistance to corrosion. In many cases, their superior mechanical properties make them preferable to the common aluminum-silicon alloys.

These alloys are widely used in Diesel engines for such parts as crankcases, oil pans, manifolds, cylinder heads, and supercharger equipment. They are used for cylinder heads, manifolds and housings in automotive engines. The alloys are used in some aircraft engines for cylinder heads, crankcases, jackets, housings, and covers. Alloy B-41 is particularly adapted for liquid cooled cylinder heads requiring in addition to pressure tightness, good mechanical properties at temperatures up to 400 degrees Fahr. Alloy B-43 was developed principally for air cooled aircraft cylinder heads where strength at temperatures from 400 to 600 degrees Fahr. is an important requisite.

The heat treated aluminum-silicon alloys are also employed for air compressor and air brake parts and pneumatic tools. In addition to this, they are used for fans, impellers, tank car fittings, housings and covers for electrical, textile, and foodstuff equipment, as well as many other miscellaneous industrial applications.

F. RECOMMENDED PRACTICE FOR THE ALUMINUM- MAGNESIUM ALLOYS

1. Chemical Control Limits.

Alloy	Cu. Percent	Iron Percent	Si. Percent	Mg. Percent	Others
B-61	0.10 max.[28]	0.40 max.	0.25 max.	3.25-4.25	Total Imp. 0.60%

[28]U. S. Army Specifications 57-72-4—0.05% max.

The excellent physical and mechanical properties of the aluminum-magnesium alloys depend largely upon the purity of the metal. It is therefore essential that iron and silicon content be kept at a minimum to realize maximum mechanical properties and corrosion resistance. Several modifications of this alloy, however, employ 1 to 2 per cent silicon, which is added to improve the casting characteristics. In spite of these additions, such an alloy has excellent corrosion resistance although slightly inferior to alloy B-61.

Copper tends to lower corrosion resistance and, to a lesser extent, mechanical properties.

Iron tends to lower the corrosion resistance and mechanical properties of alloy B-61.

Another modification of alloy B-61 includes 0.5 per cent manganese which is added to improve corrosion resistance. There is some question whether such an addition effects any appreciable change in this factor, although it does tend to reduce the oxidation of the magnesium.

2. Physical Properties of Sand Castings.

Ultimate Tensile Strength, Lb. per sq. in. (Min. to Avg.)[29]	22000-25000
Yield Strength, Lb. per sq. in. (Permanent Set = 0.2%) (Avg.)	12000
Modulus of Elasticity, Lb. per sq. in. X 10^6 (Approx.)	10
Elongation, Percent in 2 in. (Min. to Avg.)	6.0-8.0
Brinnell Hardness—10 mm ball, 500 Kg Load (Approx.)	50
Ultimate Compressive Strength, Lb. per sq. in. (Approx.)[30]	50000
Specific Gravity (Approx.)	2.65
Weight per cu. in.—Lbs. (Approx.)	0.095
Pattern Maker's Shrinkage, inches per foot	1/10-5/32
Solidification Range—°F (Approx.)	1185-1075
Endurance Limit, Lb. per sq. in. (R. R. Moore Machine 500,000,000 Reversals)	5500
Coefficient of Thermal Expansion per °F X 10^{-6} (Approx.) 68-212°F.	13.3
68-572°F.	14.4

[29]Tension values determined from standard ½ in. diameter A.S.T.M. separately cast test specimens.

[30]Results of tests on specimens having 1/r ratio of 20. All specimens failed by lateral bending.

3. **Conforming Specifications.**

Alloy		
B-61	Aluminum Company of America	No. 214 alloy
	Society of Automotive Engineers	No. 320 alloy
	U. S. Army Ordnance Department	No. 57-72-4

4. **Development.**

The past few years have witnessed the introduction of an aluminum-magnesium alloy containing 4 per cent magnesium as the major alloying element. This is by no means a new alloy. However, it is only recently since high purity aluminum has been available that the most desirable characteristics have been realized.

Alloy B-61 (4 per cent magnesium) is not susceptible to heat treatment and is therefore used in the "as cast" condition. The outstanding characteristic of this alloy is its exceptional resistance to corrosion and for this reason it is used for applications in which even the aluminum-silicon alloys are unsatisfactory.

Alloy B-61 is somewhat more difficult to cast than many of the previously discussed alloys. Additional precautions in foundry technique must be taken to insure freedom, particularly from shrinkage, dross, and oxidation of magnesium. The alloy is not considered "hot short" and consequently castings can be made with little danger of cracking. The alloy machines quite well although the hardness is not exceptionally high. This alloy is not considered to be especially pressure tight. In this respect, it is inferior to the aluminum-silicon alloys. Proper observance of certain phases of foundry technique, however, will tend to materially improve this condition.

The alloy is capable of taking a very excellent polish and is especially adapted to anodic finishes (See section A3).

5. **Field of Use.**

Alloy B-61 is finding extensive application where maximum resistance to corrosion and discoloration is desirable or necessary. The alloy is used for cooking utensils, dairy and plumbing equipment, pipe fittings and valves, and cash register and railway car fittings. Since the alloy takes a high polish and is well adapted to anodizing, it is used for vending machine parts and ornamental architectural castings.

Protective Value of Zinc and Cadmium Coatings on Steel

For many years hot galvanized iron—that is, iron coated by dipping it into molten zinc—has been used extensively where protection against corrosion of the iron is more important than appearance. Zinc plating, also known as electrogalvanizing, is used especially on those parts where the dimensions must be controlled. To some extent cadmium plating has replaced zinc plating, in spite of the higher cost of cadmium, because of its better initial appearance.

An investigation described in the February number of the Journal of Research (RP867) of the National Bureau of Standards was undertaken to determine the relative protective value of these coatings. Numerous specimens were prepared through cooperation with the American Electro-Platers' Society, and, with the assistance of the American Society for Testing Materials, these were exposed in six locations. The results of 3½ years' continuous exposure may be summarized as follows:

Thin coatings of zinc or cadmium furnish better protection against corrosion of iron or steel in rural or marine climates than do equally thin coatings of nickel or chromium (reported in 1934), although the zinc and cadmium lose their luster more rapidly. In industrial locations, where sulphur compounds are present in the atmosphere, both zinc and cadmium fail rather rapidly. Under these conditions cadmium fails in about two-thirds of the time required for failure of zinc coatings of the same thickness. Deposits of an alloy containing about 90 per cent of zinc and 10 per cent of cadmium are somewhat superior to either zinc or cadmium. The conditions selected for preparing the steel and for the plating have little effect on the protective value, provided the deposits are adherent and have the necessary thickness. Electroplated zinc coatings have about the same value as hot-dipped zinc coatings with the same thickness.

Accelerated tests are not entirely satisfactory for determining the relative merits of such coatings. For example, cadmium coatings last longer in the salt spray but fail more rapidly in an industrial climate. The best criterion for the quality of a zinc or cadmium coating is its minimum thickness. This can be determined by various simple laboratory tests, such as the dropping test, microscopic examination, and the chord test.

Expansion of Metals

Q.—What metal, with a reasonably high melting point, has the greatest expansion possibilities? Also what metal, after being heated, will cool in the shortest space of time?

A.—Ignoring such substances as sodium and selenium, which we assume would not serve your purpose, the following is a list of metals and alloys which have high coefficients of linear expansion.

	Linear Expansion in inches per inch per degree Cent.	Melting Point
Cadmium	.000029	610° F.
Lead	.000029	620° F.
90 aluminum, 10 copper	.000028	1166° F.
Magnesium	.000028	1204° F.
97 zinc, 3 aluminum	.000027	790° F.
80 copper, 20 tin	.000027	1634° F.
Duralumin	.000027	1200° F.
Tin	.000027	450° F.
Zinc	.000026	788° F.
Lead-Tin solder	.000025	504° F.
Aluminum	.000024	1202° F.

Of the above metals, the lead, solder, cadmium and tin will cool somewhat more rapidly than the others, assuming that the weight of the piece is the same in each instance. If the size, rather than the weight is the same, aluminum and its alloys will probably cool most quickly of all. The shape is also a factor. If the piece is in the form of a thick block, aluminum will cool much faster than some of the heavier metals, but if you were to compare two thin sheets of equal area, the difference would not be so great.—**H. M. St. John.**

A Brass Foundryman's Progress

By OTTO GERLINE

Gerline Brass Foundry Company,
Kalamazoo, Mich.

How a Boy Grew Up to Be a Brass Foundryman. His Adventures, Joys and Sorrows, as Told to W. J. Reardon—Part 12.*

DEAR Billy:—

In my last letter I told you that I would write about how I got into the brass foundry business for myself, and in my next letter I will tell you how I got out of it.

I believe the last year that I was with Fairbanks-Morse Company, we showed a profit of about $13.-000.00. Twenty-five per cent of this was mine, besides my $4.00 per day as Foreman, Superintendent or Manager, whatever you wish to call it. And, so I figured that if I could make $13,000.00 for Fairbanks-Morse & Company, I perhaps could do so for myself.

Samuel Franklin, a wealthy junk dealer, Samuel B. Meyers, (by then foreman) and myself, started the Gerline-Meyers Brass Foundry Company, of Kalamazoo, Mich. We capitalized at $20,000.00, and paid in $12,000.00, or $4,000.00 each. My salary to be $40.00 per week, Mr. Meyers $35.00 per week; Mr. Franklin nothing.

I had at that time a home that I had purchased for $2,800.00 through a building and loan association. I put in enough money in alterations so that in all the home stood me $4,500.00. I sold it for $2,800.00, and paid a real estate dealer $1,000.00 for selling it for me. You can tell from this that I am not so hot at handling real estate. Anyway, I received $1,800.00 when the deal was closed. I put up $1,500.00 cash into the new company, and the First National Bank took my $4,000.00 worth of stock as collateral and loaned me the $2,500.00 to pay my $4,000.00 of the $12,000.00. I had nothing left, and the First National Bank voted my stock. It was a case of make or break. This was in 1913, just as we had a nice panic coming on. But then who cares to remember a 1913 panic when we have a 1929-1935 depression. Anyway, we started in August, 1913. By the end of the year when we took inventory we were about $800.00 to the bad. Mr. Meyers got out his pencil and figured if we lost $800.00 in five months it would mean about $2,000.00 per year, so he wanted to get out. He never took into consideration that new sand, new men, new business etc., was not in line to make a lot of money. A saloon, or what have you, is about the only business I know of that can make money from the start on a capital of $12,000.00, unless it is the red ink industry. This is no slur on Mr. Meyers, who worked for me as a moulder shortly before I closed my plant. Mr. Franklin and I decided that if Mr. Meyers was dissatisfied we might as well pay him his $4,000.00, and let him get out. We made this offer to him, but he insisted on having a lawyer to handle this for him. Why, I don't know to this day. Anyway, the next day a lawyer came down to our office and demanded to see our books. The way this gentleman DEMANDED to see our books did not sit well with yours truly, and so I told him that if he would ask permission to see our books he could help himself, but if he insisted on DEMANDING I would perhaps throw him out. He sized me up, and decided to be a gentleman and asked permission to see the books. After this was granted him, he worked several days on the books and finally informed Mr. Meyers that his stock was worth $3,000.00. I had offered him $4,000.00 several days before, so we took up Sam's stock at $3,000.00, as per his lawyer's figures. What Mr. Meyers paid to this lawyer I was never able to find out. Sam just accused me of beating him out of $1,000.00, and I still claim that it was his lawyer who did it. Anyway, we bought him out for $3,000.00, his lawyer's figures. Use your own judgment here about who was right, and who was wrong. At any rate he lost $1,000.00 hiring a lawyer. I still can't find out from Sam how much he paid this lawyer, but his $1,000.00 loss made up our $800.00 deficit for the five months period.

Well, next year we made somewhere in the neighborhood of $12,000.00 profit. Mr. Franklin and myself split this 50-50, and I paid my $2,500.00 to the bank, and $1,500.00 to Mr. Franklin for my half of Mr. Meyers' holdings. Our profits increased from year to year, and in the eight years Mr. Franklin was with me I paid him on a 50-50 basis $62,000.00 in dividends, and later when I purchased Mr. Franklin's holdings I paid him $35,000.00 for his half. In other words, Mr. Franklin put in $5,500.00 and drew out $62,000.00 and $35,000.00 in eight years. Not a bad investment.

And now, Dear Old Billy, I want to tell you what you knew long ago. In 1929 I was worth a quarter of a million, after starting from 30c per day in a core room, picking nails and straightening core wires. Or, you may go back further to when I peddled papers, shined shoes, cleaned cuspidors on the Bowery, to make a living, with Central Park, in the Summer time as my home.

And now that I am finishing this article for you, I will sign off and leave my last article of "Why I Quit Business" for my last one.

I don't know whether or not anyone of the readers of these articles enjoyed them. I do know of one, the late Frederic B. Stevens of Detroit, (a real man).

This series will be concluded in an early issue.—Ed.

*Parts 1 to 11 were published in our issues of July, 1929; November, 1929; May, 1930; August, 1930; February, 1931; September, 1931; December, 1931; July, 1932; June, 1934; March, 1935 and June, 1935.

Second Thoughts About Foundry Furnaces

By M. G. CORSON
Consulting Metallurgist, New York

A Search for the Ideal Furnace for Brass Foundry Operations.

IN OLDEN times when the non-ferrous foundry was occupied mostly in casting church bells, statues and cannon, the number of heats per year was rather small but the heats themselves were large. Many tons of metal had to be melted at once. This was the age of the wood-fired stationary reverberatory furnace.

The introduction of non-ferrous casting in industry and shipbuilding called for smaller castings in a variety of alloys. Fireclay crucibles were invented and a number of them were accommodated within the same old open flame furnace. Each crucible contained hardly as much as 50 lbs. of metal.

With the advent of the graphite-clay crucible individual pit furnaces fed with either charcoal or coke came into use. The same chimneys used to provide the draft for old open flame furnaces could serve a series of pit fires.

The size of the pit fire crucible increased continuously but never went beyond 500 lbs. of copper, larger crucibles being not easy enough to handle.

To-day such primitive pit fires are still of the utmost importance for the foundry. Even the largest brass mills equipped with numerous electric furnaces retain an auxiliary series of pits numbering anywhere from ten to thirty fires. Small foundries rely upon them practically to the exclusion of any other type of furnaces. And since it is costly to erect a chimney for two or three fires they use forced draft delivered by electrically powered blowers.

The introduction of gas or oil firing permitted the increase in sizes of the crucible furnaces, and tilting furnaces were introduced. Their maximum size to-day is about 1,500 lbs., though the 600 lbs. size is far more frequently used.

For foundries specializing in large castings weighing anywhere from 3,000 lbs. to 10 tons, even the large tilting crucible furnaces are of little use. Therefore some of these retained the old type of open flame, wood or coal-fired stationary furnaces. Others introduced oil or gas fired furnaces, either drum or pear shaped (Rockwell and Schwartz furnaces are the exponents of the two shapes in this country), but always tilting for pouring.

All these furnaces had their advantages and drawbacks, to wit:

Pit fires. Rather flexible from the viewpoint of compositions to be melted; quite cheap to build and repair. Low cost of fuel. But rather dirty in operation, precluding the use of intelligent labor, and of a very limited capacity per pit.

Tilting crucible furnaces. We shall discuss these later.

Open flame furnaces—stationary type. Unlimited capacity and cheap to build, but rather inflexible and slow working. Require much space.

Tilting open flame furnaces gas or oil fired. These seemed for a time to provide the most rational solution of the foundry furnace problem. The price is not too high. The size can vary a lot. Operation is rather rapid. Unfortunately the metal is in continuous contact with the torch of the burning fuel. In the case of brasses it means a considerable loss of zinc and a rather indefinite composition of the melt at the moment of pouring. For other alloys it means the possibility of strongly overheating the melt, saturating it with gases and making plenty of dross.

All this made the foundryman working on a large scale and bent on the production of quality metal yearn for a more nearly perfect melting apparatus. For many reasons his eyes were turned in the direction of electric melting. And to-day we have three types of electric melting furnaces in the American non-ferrous foundry: the Detroit Rocking furnace, the Ajax Wyatt induction furnace and the Ajax-Northrup high frequency furnace.

For a time electric melting furnaces were objected to on account of the high cost of current. Even to-day only the brass mills and a few of the specialty foundries rely mainly upon the electric furnace for their melting. The majority still objects to the high price of power.

This article is by no means written to favor the electric furnace, at least not of the type used to-day. However, we must point out that to object to them on the basis of the cost of power means a rather short-sighted policy.

Even to-day during the depression with copper below 10 cents per lb. and zinc still lower, non-ferrous castings command the price of from 15 cents for large pieces like ship propellers up to 22 cents for production work on small pieces. On the other hand the cost of heat, whether electrically or coal produced is only a fraction of a cent per lb. of castings. And should one source of heat definitely lead to better quality castings and secondly to better working conditions it ought to be adopted without fail.

From this viewpoint we shall discuss the foundry value of electric melting.

The Detroit Rocking furnace. Its rocking is needed mainly for the purpose of taking away the heat from the lining exposed to the radiation from the arc.

It is an expensive piece of apparatus. It is easy to overheat the metal. The surface of the molten metal changes continuously and this favors oxidation. The arc develops plenty of extremely hot carbon monoxide which can be absorbed by the metal.

This furnace is not particularly flexible. To clean the lining mechanically is beyond possibility. To change from one composition to another the furnace must be washed out with a considerable amount of the composition to be made and that amount must be scrapped.

And there is no indication that the metal from a properly conducted Detroit furnace is any better than that which is made in a properly conducted crucible furnace.

The Ajax Wyatt furnace. An exceptionally good apparatus for the making of brass and other large production alloys in the brass mill, but even less flexible than the Detroit furnace. The strong stirring action of the current running through the vertical induction channel is rather a drawback, than an advantage. Even when some five inches of liquid metal cover the upper ends of the chanel, fountains of molten metal break through, always renewing the surface of the metal and exposing it to continuous oxidation. And the down-going stream of the molten metal can carry with it plenty of oxide—unless we agree that no oxide can stay in suspension under any condition. At any rate in a number of alloys the use of the Ajax Wyatt furnace leads to plenty of dross and the composition of the cast metal is none too close to that of the charge.

Theoretically speaking the Ajax Wyatt furnace ought to guarantee the melt from absorbing any gases —except by oxidation. There is no source of hydrogen, carbon monoxide or sulfur around. Still gassy billets and gassy cakes are by no means infrequent even in this case.

One feature is strongly in favor of electric furnaces —their clean and comfortable operation.

We come now to the question of the tilting crucible furnace. This apparatus is far from perfection now, but it can be perfected and in our opinion should form the most essential tool of the non-ferrous foundry. However, the builders of such furnaces must stick to one direction of development. The furnace must be made to produce metal of **the highest characteristics.** Everything else is secondary.

Especially important is it to forget about "economy" in fuel consumption. This economy cannot be achieved without producing inferior metal.

The essential points in producing a proper tilting crucible furnace are the following:

Instead of one long torch of burning fuel there should be at least three and preferably six short slow burning torches.

They should be placed vertically and the burning gases should spread along a vertical axis only. There should be no "spiralling" around the crucible.

Burned gases must come out from the side—not from the top. The attempt to use them to "preheat" the charge leads mainly to a forced contact between the gases and the molten metal. Such metal cannot be reasonably free from absorbed gases.

The crucible must stand deep in the furnace and be well covered up during the melting so as to eliminate both the furnace gases and air as far as possible.

There is no reason to stop at the capacity of 1,500 lbs. for graphite clay crucibles. They can be made up to 3,000 lbs. and perhaps bigger.

If a metal of the highest characteristics is desired, and if it does not contain much zinc, it must be degasified. To achieve this we would advise providing a number of electrically heated, quick-locking tanks in which the ladle with the metal could be subjected to a good vacuum for five minutes or so. This would eliminate a great deal of the absorbed gas if not all of it.

As the proper melting equipment for a large nonferrous foundry we would advise:

A number of tilting crucible furnaces of 3,000 lbs. capacity so as to be able to produce quite large castings if need be.

One tilting crucible furnace of 1,500 lbs. capacity.

Two tilting crucible furnaces of 700 lbs. capacity.

Two tilting crucible furnaces of 400 lbs. capacity.

With three furnaces of the maximum capacity a foundry so equipped will have a simultaneous metal capacity of 13,000 lbs. and a daily capacity of 40,000 lbs. (8 hours).

As an addition to oil or gas fired crucible furnaces we should recommend a few electric furnaces with metallic resistors. Whenever castings of the utmost responsibility are made, whether of high tensile brass or high tin bronzes, the needed amount of metal could be melted first in the regular crucible furnace, then poured into a few smaller crucibles and allowed to stand for some time within the electric furnace. The temperature need not be over 1050° C. This will lead to a far greater refinement of the metal because both the elimination of gas and floating out of oxide and dross are mainly a matter of time.

The Electric Furnace

I have reviewed the above article by Mr. M. G. Corson and find that it has many good points. In the final analysis, however, it does seem to be somewhat biased in favor of melting by crucibles.

With nearly 900 furnaces in operation throughout the world, we have made very few mistakes. It must be admitted that this is an enviable record. When approaching any set of conditions existing in any particular plant, we are always cautious, preferring to recommend only that equipment which we honestly believe is best suited to the customer's requirements. Therefore, it frequently occurs that we are obliged to recommend other types of furnaces than our own, particularly in jobbing work.

Occasionally one hears of some new development in melting, supposedly economical in operation and producing excellent results. Personally, I do not get excited about these until they have proved their merit in a number of plants. Two exploitations within the last five or six years are recalled to mind: one using gas and the other oil. These created quite a furor, and I frankly admit that one of them gave us some concern, although at that time I stated that it would last about two years, in which contention I was proved correct by subsequent developments. In two cases we have sold additional equipment to plants who expected to solve their problems with a new fuel-fired type of equipment. Both of the latter plants later stated unofficially that they wished they had never experimented, since this was done at a considerable expenditure of money, which could have been employed to better advantage in other directions.

AJAX ELECTRIC FURNACE CORPORATION
Henry Gieseke,
Secretary and Sales Manager.
Philadelphia, Pa.

Testing Materials Society Committee Meetings

Reports on Electroplating; Fatigue; Copper Wire; Copper Alloys; Die Cast Alloys. Symposium on High Strength Constructional Materials.

AS THE result of a large number of meetings of A.S.T.M. standing committees, held in Pittsburgh during Committee Week, March 2-6, many new standard specifications and methods of test are to be recommended to the Society. In all there were about 150 meetings, including main standing committees, their sections and subcommittees.

The total registered attendance for the group meetings was about 625, exceeding that of any previous year. A large number of committees in the ferrous and non-ferrous fields met and as would be expected in Pittsburgh, these meetings were exceptionally well attended. Several of the committees are planning to sponsor technical programs at the Society's annual meeting in June in Atlantic City, including the committees on water for industrial uses, metallography and rubber products.

JOINT CONFERENCE ON ELECTROPLATING

CHAIRMAN, DR. WILLIAM BLUM

The joint committees on electroplated coatings, sponsored jointly by the American Electro-Platers' Society, National Bureau of Standards and A.S.T.M., considered a number of comments that had been received on the three specifications covering electrodeposited coatings of zinc, cadmium, nickel and chromium on steel, which were published last year. Discussion at the meeting indicated that the salt spray test is not especially useful for testing zinc and cadmium coatings but that a test to distinguish between good and poor coatings of the same thickness would be desirable. Purity of the coatings might also be specified. It was the sense of the meeting that while the present symbols in the specifications are satisfactory, consideration could be given also to a designation based on the specified thickness, for example, "zinc 50" would refer to a zinc coating with a minimum thickness of 50/100,000 of an inch.

While thicker coatings than those specified in the requirements are occasionally required, the meeting felt that at present there was not sufficient demand for thicker coatings to justify action on this matter. Consideration of the present requirements calling for an average of 0.00002 in. of chromium is not excessive for the automotive industry.

The specifications at present require a minimum of 0.00015 in. zinc which is usually equivalent to an average of about 0.0002 in. and the committee indicated that this is probably adequate for mild exposures. Based on consideration of the comments received, the committee took action to recommend that the specifications be continued as tentative standards for another year without change.

There was detailed discussion of the program of exposure tests of plating on non-ferrous metals. The status of the program and the preparation of specimens to be included in the series of tests was reviewed. The principles of the chord method for measuring thickness were outlined and a few preliminary results of the quantitative measurement of adhesion of electroplated coatings were presented to the committee. Arrangements are under consideration for the periodic inspection of the specimens.

FATIGUE OF METALS

CHAIRMAN, PROF. H. F. MOORE

The Research Committee on Fatigue of Metals reviewed various comments which had resulted from the 1935 report of the committee in which there was presented a set of notes on the rotating-beam test for fatigue strength, covering tests on machines either of the centrally loaded or the cantilever types.

A progress report was presented covering the cooperative studies on the part of A.S.T.M. Committee E-4 on Metallography and the Fatigue Committee involving X-ray diffraction studies and their relation to fatigue test results. While no clear correlation has as yet been shown, the study is progressing. It was indicated that long-time tests are necessary to enable definite conclusions to be drawn.

There was discussion of the progress made in the study of the effects of occasional high overstress on subsequent resistance to repeated working stresses and reports of work in this study were submitted from several laboratories.

New types of testing machines for fatigue tests were discussed. These new machines included high-speed machines (10,000 cycles of stress per minute), machines for repeated loading of large specimens of full size structural and machine parts, and machines for testing wire under reversed stresses.

Tests of the effect of sharp notches in small specimens and in large specimens were reported.

Methods of detecting fatigue cracks when they were still very small were discussed, including tests using magnetized iron dust, etching and direct microscopic examination. Differences in reporting results of fatigue tests by English laboratories and by American laboratories were indicated. Minor matters noted were fatigue cracks under repeated compression, and metals showing unusually high ratio between fatigue strength and ordinary tensile strength.

COPPER WIRE

CHAIRMAN, J. A. CAPP

Committee B-1 on Copper Wire, discussed at length certain modifications which were proposed in the Tentative Specifications for Bare Stranded Copper Cable: Hard, Medium-Hard or Soft (B 8-35 T), particularly with regard to the section on brazes. (These specifications cover bare, stranded cables made from round copper wires, for general use as electrical conductors.)

The committee also considered a proposal to recommend the adoption as standard of the existing Tentative Specifications for Bronze Trolley Wire (these specifications cover round and grooved bronze trolley wire) and to adopt the existing tentative revision of the Standard Specifications for Copper Trolley Wire (B 47-32) which cover round and grooved hard-drawn copper trolley wire. This revision essentially comprises changes in the permissible variations in the dimensional requirements in the standard sections of the grooved trolley wire.

These items will be submitted to letter ballot and if approved will be presented to the Society at its annual meeting in June in Atlantic City.

After discussion of the committee's title, the following was adopted as more adequately designating the scope of its work: Committee B-1 on Copper and Copper Alloy Wires for Electrical Conductors.

COPPER AND COPPER ALLOYS, CAST AND WROUGHT

CHAIRMAN, PROF. C. H. MATHEWSON

Committee B-5 completed new Proposed Tentative Specifications Covering Commercial Sheet and Slit Edged Strip Phosphor Bronze which material is commonly used for drawing, forming, stamping and bending, particularly in the making of spring devices for electrical apparatus. The specifications cover four grades, A, B, C and D, of sheet phosphor bronze in six different tempers, namely, soft, half-hard, hard, extra hard, spring and extra spring. The committee also completed new Proposed Specifications Covering Copper Nickel Condenser Tubes which it is planned to submit to the Society at the annual meeting in June for publication as tentative.

The group of four existing tentative specifications covering copper-silicon alloys has been thoroughly studied and reviewed by the committee. As a result of this, revisions have been completed in three of the specifications which cover respectively, copper-silicon alloy plates and sheets (B 96-34 T); sheet copper-silicon alloy (B 97-34 T) and copper-silicon alloy wire for general purposes (B 99-35 T). Further study is to be given to desirable modifications in the Tentative Specifications for Copper-Silicon Alloy Rods, Bars and Shapes (B 98-34 T).

Committee B-5 through its Subcommittee on Cast Metals and Alloys, in cooperation with representatives of the American Railway Engineering Association and the American Association of State Highway Officials has made a thorough study of specifications for cast bronze bearing metals. The available specifications on this subject were thoroughly reviewed and as a result of this work a new specification has been prepared covering four classes of bronze castings for turntables and movable bridges. This is to be presented as a tentative specification and it is proposed to discontinue the existing Standard Specifications for Bronze Bearing Metals for Turntables and Movable Railroad Bridges (B 22-21).

The committee has also given detailed consideration to specifications for bronze castings for locomotive and journal bearings and action has been taken to report revised specifications covering lined journal bearings and for bronze bearings for locomotives to replace the Society's existing Specifications for Bronze Castings in the Rough for Locomotive Wearing Parts (B 66-28) and for Car and Tender Journal Bearings, Lined (B 67-28). These new specifications will conform to the corresponding specifications on this subject of the Association of American Railroads, Mechanical Division.

The following tentative specifications and revisions of existing standards will be recommended to the Society for adoption as standard if the letter ballot of Committee B-5 is favorable:

Tentative Specifications for Copper-Base Alloys in Ingot Form for Sand Castings (B 30-32 T).

Tentative revision of Standard Specifications for Sand Castings of the Alloy: Copper 88 per cent; Tin 8 per cent; Zinc 4 per cent (B 60-28).

Tentative revision of Standard Specifications for Steam or Valve Bronze Sand Castings (B 61-28).

Tentative revision of Standard Specifications for Composition Brass or Ounce Metal Sand Castings (B 62-28).

Immediate revision of Standard Specifications for Aluminum-Bronze Castings (B 59-28) (Change in iron content requirement of Grade B).

The Standard Specifications for Yellow Brass Sand Castings for General Purposes (B 65-28) are to be revised and reissued as tentative specifications. In preparing this revision the committee has been guided by the fundamental principle that the chemical requirements constitute merely a guide to the type of alloy and the physical requirements shall govern acceptance of castings. Likewise, the existing Specifications for Manganese-Bronze Ingots for Sand Castings (B 7-27) and for Manganese-Bronze Sand Castings (B 54-27) are to be revised and will be published as tentative standards.

DIE-CAST METALS AND ALLOYS

CHAIRMAN, J. R. TOWNSEND

Committee B-6 on Die-Cast Metals and Alloys decided to recommend the continuation as tentative for another year of the Specifications for Aluminum-Base Alloy Die Castings (B 85-33 T). Certain changes are to be incorporated in the specifications with the dropping of Alloy No. VI, modification of the composition of Alloy XII and certain modifications in the tables of properties.

Accelerated corrosion tests on Alloys IV, V and Va have been completed and physical tests made. The data, which will appear in the committee's annual report, cover a year's exposure to salt-spray tests.

As a result of discussion of the advisability of including physical test data in the Tentative Specifications for Lead and Tin-Base Alloy Die Castings (B 102-35 T), the subcommittee in charge will be asked to conduct tests to determine the strength, hardness and aging properties of the alloys, the tests to extend over a period of three years.

The committee is planning to undertake exposure tests on magnesium-base alloys similar to the original atmospheric tests of aluminum and zinc-base die-cast alloys. A number of proposals have been made to the committee covering new alloys and new types of corrosion testing of die castings, such as corrosion of washing machine parts.

As a result of the discussion at one of the subcommittee meetings devoted to finishes of die castings, the committee plans to include with its 1936 report a report on this subject, to comprise a paper by the chairman of the subcommittee, J. C. Fox, covering details of methods for finishing zinc and aluminum-base alloy die castings. Two types of electroplating of zinc die castings will be described and the preparation of casting surfaces and methods for application of lacquers, enamels, japans, etc., with data for other miscellaneous finishes applied to zinc die castings are to be included. Discussion in connection with aluminum-base alloys will cover the finishing methods involving polishing, electroplating, enameling and anodic oxidation. The paper will also detail methods of control and inspection and testing of various finishes.

HIGH-STRENGTH METALS SYMPOSIUM

Considerable interest was evoked by the five technical papers comprising the Symposium on High-Strength Constructional Metals which was the technical feature of the meeting. Two sessions, morning and afternoon, were devoted to the papers and discussion. Discussion of the papers was most interesting, especially in the afternoon session when the two papers on steels were given. The papers were:

Alloys of Aluminum and Magnesium—E. H. Dix, Jr., Chief Metallurgist, and **J. J. Bowman**, Metallurgical Division, Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa.

Alloys of Copper—C. H. Davis, Metallurgist, The American Brass Company, Waterbury, Conn.

Alloys of Nickel—G. F. Geiger, Research and Development Department, The International Nickel Company, 67 Wall Street, New York.

Carbon and Low-Alloy Steels—E. F. Cone, Editor, Metals & Alloys.

Corrosion-Resisting Steels—E. E. Thum, Editor, Metal Progress.

The symposium was developed by a special program committee under the chairmanship of **Jerome Strauss,** Vice-President, Vanadium Corporation of America. Extensive work on the part of the authors was evidenced in the great amount of valuable data and information presented. In the opinion of leading technologists at the meeting, the published symposium will serve a most useful purpose in bringing together in one convenient place the latest information on the physical and metallurgical properties, etc., of the constructional and higher strength alloys developed in recent years.

The question of corrosion came up for spirited discussion in the afternoon session and it was evident that engineers—and designers especially—would welcome authoritative information on the corrosion-resistant properties of some of the newer constructional metals.

Measuring the Thickness of Metal Coatings

Recently adopted specifications for electroplated coatings include requirements for the minimum thickness on any significant part of the plated surface, rather than the average thickness that has heretofore been specified. The application of such specifications depends upon the determination of thickness at different parts of the surface. This is usually done by microscopical measurements of metallographic cross sections, a procedure that is laborious and time-consuming and that destroys the test specimen.

Recently F. C. Mesle described an ingenious method of measuring the thickness of silver on teaspoons, especially on the outside of the bowl where a greater thickness or "overlay" is often applied.* The same principle can be used to measure coatings on flat surfaces. If a coating on a curved surface is just cut through with a flat file, or that on a flat surface is cut through with a grinding wheel of known radius, the thickness of the coating can be computed from the equation

$$T = \frac{C^2}{8R},$$

where **T** is the thickness, **C** is the chord, that is, the width of the cut, and **R** is the radius of the curved surface or of the grinding wheel.

To apply the method to a practically plane surface, the latter is tilted slightly, so that a tapering cut is produced when the surface is passed under the grinding wheel in a direction parallel to its axis. The chord is then measured just at the point where the base metal is exposed. This procedure is especially valuable for measuring the individual layers in multiple coatings, such as of nickel, copper, and nickel on steel.

For testing deposits on soft base-metals such as copper, brass and zinc-base die-castings, a wheel with a relatively coarse grain, such as a 90-grain, is preferable. On steel, a 120-grain wheel gives sharper cuts. Width of cut is measured with a lens and scale.

Tests made on specimens plated with known thicknesses showed that the method is accurate to about 10 per cent on coatings at least 0.0002 inch (0.005 mm.) thick. It is a much more rapid method than the metallographic examination, and under favorable conditions the results are almost as accurate. In general the tested specimen can be salvaged by stripping, polishing, and replating. This is an advantage in testing large pieces such as bumper bars. It is hoped that after thorough trial this method will prove useful in testing plated products for specifications.

A more complete account of this work will be found in RP866 in the February number of the Journal of Research of the National Bureau of Standards.

* See Metal Industry for August, 1935, pages 283-9.

Stripping Tin

Q.—We are seeking a formula for stripping block tin from gold and silver without spoiling the finish or color of the ring. The block tin is used as a solder and occasionally flows into the design.

A.—Block tin may be stripped from gold by the use of a 50% muriatic acid solution at 130 deg. F. It may be necessary to brush article slightly after dissolving tin due to a loose film of smut left. The action of the acid on the gold will tend to brighten it. It is suggested that the same formula be used on the silver, although it may be necessary to reduce concentration and temperature so as not to affect the silver.

—T. H. Chamberlain.

British Institue of Metals Meeting

Papers on Copper and Copper Alloys, Solder, Aluminum and Aluminum Alloys, Nickel Silver, Zinc Coatings, Tin Alloys, Corrosion and Hot Tinning.

THE Twenty-eighth Annual General Meeting of the Institute of Metals was held in London on March 11, 12, 1936. The retiring President, **Dr. H. Moore,** inducted the incoming President, **W. R. Barclay,** into the Chair.

Below are abstracts of the papers read.

THE TRANSFORMATION IN THE COPPER-GOLD ALLOY Cu_3Au

By C. Sykes and H. Evans

The effect of the transformation in the alloy Cu_3Au on the electrical resistance, X-ray structure, and specific heat has been investigated experimentally, and it is shown that the general character of the transformation is satisfactorily predicted by the Bragg-Williams theory of the formation of super-lattices by atomic rearrangement.

The atomic rearrangement process involves first the formation of small nuclei having a relatively high degree of order. These nuclei then grow to a size approximating to that of the individual crystals, if a constant temperature is maintained. If, however, the alloy is continuously cooled before it attains equilibrium, two processes proceed simultaneously, then nuclei tend to grow, and at the same time the degree of order in the nuclei increases owing to the reduction in the temperature.

The existence of such nuclei is not considered in the statical theory of super-lattices, so that it is not surprising to find that the theoretical predictions regarding the rate of relaxation into the equilibrium state are not in agreement with experiment.

PLASTIC DEFORMATION AND AGE-HARDENING OF DURALUMIN

By Major P. L. Teed

Plastic deformation of the type employed in the experiments described, produces, **with the freshly normalized, cold-water quenched alloy,** an acceleration of the normal age-hardening process, a marked increase in the proof stresses ultimately developed by the material after prolonged subsequent storage at atmospheric temperature, a slight **decrease** in its ultimate stress, and a relatively greater **decrease** in its shear stress. Similar deformation of specimens from the same sheet, **but fully age-hardened prior to deformation,** gives rise to an immediate increase in hardness which is virtually stable and **increases** in the proof and ultimate stresses.

THE EFFECT OF MOLTEN SOLDER ON SOME STRESSED MATERIALS

By G. Wesley Austin

Breakages of steel and non-ferrous parts during assembly by soldering while subjected to stress, led to this investigation on the effect of molten solder on stressed tensile test-pieces of many of the metals and alloys used in engineering. Although the phenomenon was found to be very general, certain materials proved less susceptible than others; a selection of materials which will offer resistance to the simultaneous action of stress and solder is thus possible.

EXPERIMENTS ON THE ELECTRICAL RESISTANCE OF COPPER AND SOME COPPER ALLOY WIRES

By Clement Blazey

The electrical resistances of wires made from 7 samples of H.C. wire-bar copper, 2 samples of cadmium-copper, a furnace-refined copper, and various specially-prepared samples were measured after annealing in carbon dioxide over the range 300°-950° C. Two methods of cooling from the annealing temperature were used: quenching in water, and slow cooling in the furnace; slow cooling was sometimes replaced by reheating at a fixed temperature, such as 500° C.

It was found that, in general, minimum resistance is obtained on annealing at about 500° C. and that a steady increase in resistance occurs when the wires are quenched from temperatures above 500° C. This increase, however, tends to disappear when slow cooling is adopted or when the quenched wires are reheated at 500° C. In wire-bar copper the increase due to quenching from 950° C. varies from about 0.5 to 1 per cent. It is not greatly affected by variations in cold-drawing methods or by heat-treatment of the rolled rod before drawing.

With cadmium-copper, quenching from a high temperature does not increase the resistance to an unusual degree, but with fire-refined copper it causes an increase of nearly 10 per cent.

Wires drawn from wire-bar copper that has been remelted under charcoal show a greater increase in resistance on quenching from a high temperature than those made from the original wire-bars. When, however, the remelting takes place in conditions that permit an increase in oxygen content, the resulting wires show only slight differences in resistance with variations in annealing treatment.

Additions of sulphur and selenium to copper of low oxygen content cause marked increases in resistance on quenching from high temperatures. In these in-

stances the slowly cooled samples contain numerous small inclusions, but the quenched samples are free from them.

The following causes for the increase in resistance on quenching from high temperature are briefly considered: (**a**) the nature of the furnace atmosphere, (**b**) alterations in dimensions of the wires, (**c**) quenching stresses, (**d**) the presence of blowholes, (**e**) chemical composition, and (**f**) grain structure.

METALLIC WEAR

By H. W. Brownsdon

The extent to which metallic wear takes place between two metallic surfaces in frictional contact and in the presence of a lubricant is dependent on a number of factors, the relative importance of some of which are briefly reviewed in the light of experimental results obtained on a simple machine described in the paper.

THE PHYSICAL PROPERTIES AND ANNEALING CHARACTERISTICS OF STANDARD NICKEL SILVER ALLOYS

By Maurice Cook

A detailed study was made of the hardness and mechanical properties as affected by progressively increasing amounts of cold-work, and of the annealing characteristics of seven nickel silver alloys with a constant copper content and containing 10-30 per cent nickel. The increase in hardness occurring on rolling reductions up to as much as 90 per cent was determined for all seven alloys, and for the three alloys of highest, intermediate, and lowest nickel content the effect of cold-work on the mechanical properties was studied in detail. Similarly, the annealing characteristics were determined for all the alloys by means of hardness tests, while in the case of the three alloys already mentioned this information is supplemented by data on the mechanical properties.

The modulus of elasticity increases progressively with nickel content, and in the annealed condition the hardness also increases with the nickel content. This difference in hardness, however, is not maintained when the materials are cold-worked, and after a reduction of 90 per cent in thickness by cold-rolling the order of hardness is reversed, **i.e.** the highest value is obtained with the 10 per cent nickel alloy and the lowest with the 30 per cent nickel alloy. In other words, the extent to which the alloys can be work-hardened decreases with the nickel content.

The temperature at which softening commences on annealing increases with the nickel content. In common with other copper-rich alloys, the temperature at which softening commences in an alloy of given composisition decreases with increasing amount of cold-work and the extent to which hardening occurs immediately prior to the commencement of softening also increases with the amount of cold-work.

Information is given on the density, electrical and thermal conductivity, and thermal expansion of the alloys.

A DEEP-DRAWING TEST FOR ALUMINUM

By A. G. C. Gwyer and P. C. Varley

A new test for estimating the deep-drawing quality of aluminium is described and figures are given illustrating its application to normal commercial purity metal in various tempers. The test consists essentially of two drawing operations of which the first, or cupping, operation does not alone distinguish clearly between different grades and tempers of the metal. The addition of a re-drawing operation, however, makes the test much more sensitive and distinguishes clearly between the drawing properties of the various grades.

The application of the test to aluminum of commercial purity has shown that the various medium tempers have surprisingly good drawing properties and might well be used more extensively for this purpose.

A STUDY OF THE FATIGUE CHARACTERISTICS OF THREE ALUMINUM SPECIMENS EACH CONTAINING FROM FOUR TO SIX LARGE CRYSTALS

By H. J. Gough and G. Forrest

Three specimens of aluminum, each consisting of from four to six large crystals, were submitted to alternating torsional fatigue tests. Each specimen was tested at a constant range of applied torque throughout: two specimens fractured, one remained unbroken. The observed changes in microstructure were related to the crystalline structure—as revealed by X-rays—and to the applied stressing system, particular attention being given to the influence of the intercrystalline boundaries on the deformation and fatigue-resistance.

It was found the the slip-band distribution of each specimen obeyed very closely the maximum resolved shear-stress law, calculated for each crystal as if it alone occupied the entire specimen; the influence of the boundaries on the slip-band distribution was extremely slight. Cracking occurred in regions subjected to high values of resolved shear stress. These regions were often situated in close proximity to a boundary, but the results indicate that the influence of boundaries, as such, on fatigue-cracking is very slight. In fact, it has been clearly established that fatigue-cracking is not initiated at the boundary, and also that the general course of a crack does not tend to follow a boundary.

The fatigue histories of the specimens reveal a fatigue limit, on an endurance basis of 10^8 stress cycles, of about $\pm$ 1·0 ton/in.^{2} resolved shear stress, which differs but little from that of single crystals of aluminum.

THE MAGNESIUM-COPPER ALLOYS. PART V.—THE COPPER-RICH ALLOYS

By Professor W. R. D. Jones

The copper-rich alloys which contain magnesium do not offer much hope of being useful in view of the difficulty of obtaining sound castings and the fact that many copper-rich alloys with other metals can be obtained with much less trouble and have better mechanical properties.

AN ELECTROLYTIC TEST FOR ZINC COATINGS ON WIRE

By S. C. Britton

A test for zinc coatings on wires has been designed to overcome the objections to tests based on chemical dissolution. Two tests are proposed: a stripping test designed to estimate the weight of coating which must be removed by uniform attack before the iron base is exposed, and a wrapping treatment followed by a stripping test designed to gauge the liability of a coating to crack. The stripping test is carried out by electrolysis in a specially designed cell, a fixed current density being employed so that each unit of testing time corresponds to a known weight of coating; at the end of the test, a short dip in copper sulphate solution serves to show whether the iron base has

been exposed. The test is primarily intended to ascertain whether a coating meets a specification but can be used to determine the actual thickness of coatings. Potential measurements made during strippings provide information as to the structure of coatings. Thus, it has been shown that close-wiped coatings and galvannealed coatings consist almost entirely of zinc-iron alloy. Field tests are demonstrating that the test described gives satisfactory results for conditions of atmospheric exposure while the Preece test has marked shortcomings.

THE CONSTITUTION OF THE TIN-RICH ANTIMONY-TIN ALLOYS

By Professor D. Hanson and W. T. Pelle-Walpole

The constitution of the tin-rich alloys of the system antimony-tin was investigated by means of thermal analysis, microscopical examination, and electrical resistivity measurements. The liquidus and solidus of the tin-rich phase and the temperature of the peritectic reaction are in general agreement with the results obtained by Iwase, Aoki, and Osawa. The solubility of antimony in tin is shown to decrease from 10.5 per cent at 246° C. to 3.5 per cent at 100° C.

THE INFLUENCE OF LIGHT ON ELECTRODE POTENTIAL AND CORROSION PHENOMENA OF CERTAIN NON-FERROUS METALS

By Professor C. O. Bannister and R. Rigby

A review is given of previous work on the effect of light on the corrosion of non-ferrous metals. A simple apparatus is described for the examination of the effects of light on zinc, lead, &c., under corroding conditions in conjunction with which a continuous record of changes in e.m.f. is made by the use of a thread-recorder. The influence is shown to be considerable in the case of lead and zinc, but only in the presence of oxygen, the aerated and illuminated electrode becoming more markedly cathodic. A more elaborate apparatus is then described arranged to allow perfect control over the oxygen supply to the metals under examination, and very marked response to illumination is shown in the case of zinc and aluminum. In the case of the latter metal records showing activity over 5 days are given. The maximum effect is obtained with light in the violet and near ultra-violet region, and the mechanism of the action suggested is the catalysis of the formation of protective oxide films.

INFLUENCE OF SURFACE CUPROUS OXIDE INCLUSIONS ON THE POROSITY OF HOT-TINNED COATINGS ON COPPER

By W. D. Jones

A study of the causes of porosity of tin coatings on copper shows inclusions of cuprous oxide to be one of the most important. Amalgamation is suggested as a rapid means of estimating probable porosity. Various methods for reducing porosity are discussed; these include cathodic treatment in caustic soda solution, and treatment with hypo-phosphorous acid. Oxygen-free copper is recommended as the best material to employ if non-porous coatings are to be obtained.

THE HOT-TINNING OF COPPER: THE ATTACK ON THE BASIS METAL AND ITS EFFECTS

By Edward J. Daniels

A study was made of the nature and extent of the attack of copper by tin and solder during hot-dipping. It is shown that the compound layer is invariably duplex, consisting of Cu_3Sn and Cu_6Sn_5. This layer breaks up under solvent attack and is removed from the basis metal almost as fast as it is formed. Contamination of the bath and coating owing to this action increases rapidly with increase in temperature and causes important effects on the smoothness of tin coatings to an extent that is influenced by the degree of the contamination and the quality of the basis metal.

Casting in Plaster Molds

Q.—The writer has known for a great many years of a mixture of plaster of paris, asbestos, and possibly one or two other ingredients that is known as "Passe-partout."

This, I understand, is being used in monumental work where there is no finish required after it is cast.

The information we would like to have you furnish us is what is this mixture, and how is it treated in reference to temperatures, etc. I understand that this mixture they use for pouring is made from 92 Copper and 8 Tin. Possibly you would correct me on this.

A.—Plastic refractory mixtures have long been used to a limited extent in the casting of brasses and bronzes where smooth finish and accurate dimensions without machining are of sufficient importance to offset the cost of making the mold. The exact method for producing the mold is usually a great secret in the foundry which employs it. One rather complicated mixture, disclosed in U. S. Patent 1,674,232, issued to H. Todd, June 19th, 1928, is as follows:

Sillimanite	45	parts
Monazite Sand	25	"
Coke Dust	10	"
Cow Hair	2	"
Plaster of Paris	5	"
China Clay	3	"
Ganister	10	"

Whatever the mixture the proportion of plaster of Paris must be relatively small and the ingredients must be thoroughly mixed. After the mold has been formed and the plaster of Paris has had time to set, the mold should be dried slowly at a moderate temperature, not above 150° F. As much as 48 hrs. at this temperature may be required depending upon the size and shape of the mold.

If staining of adjacent stone under severe weathering conditions is not an important consideration, an alloy of 85% copper, 10% zinc, 5% tin, is recommended as of beautiful color and easy to cast. The straight tin bronzes, such as 92-8 and 90-10, are still preferred by some but are more expensive and more difficult to cast.—**H. M. St. John.**

Chemical Compositions of Copper-Base Alloys

Tentative Standard B-30-32 T of the American Society for Testing Materials.

File This Page With Your Brass Founders' Manual.

Alloy Grade	Copper, Per Cent		Tin, Per Cent			Lead, Per Cent			Zinc, Per Cent			Other Elements Maximum, Per Cent							Total Constituents Per Cent	
	Minimum	Desired	Minimum	Desired	Maximum	Minimum	Desired	Maximum	Minimum	Desired	Maximum	Phosphorus, Maximum, Per Cent	Antimony	Iron	Nickel	Sulphur	Aluminum *a*	Silicon	Other Than Copper, Lead, Tin, Zinc and Nickel	Other Than Copper, Lead, Tin, Zinc, Nickel and Antimony
BRONZE ALLOYS																				
No. 1	87	89	5.5	6	6.5	1.5	2	2.5	2	3	4	0.03	0.25	0.25	0.50	0.08	none	0.05	0.50	....
No. 2	84	85	9	10	11	1.5	2	2.5	1.5	2	2.5	0.03	0.25	0.25	0.50	0.08	none	0.05	0.50	....
No. 3	84	85	7.25	8	8.75	1.5	2	2.5	3.5	4	4.5	0.03	0.25	0.25	0.50	0.08	none	0.05	0.50	....
RED BRASS ALLOYS																				
No. 4	84	85	4.5	5	5.5	4.5	5	5.5	4.5	5	5.5	0.03	0.25	0.25	0.50	0.08	none	0.05	0.50	....
No. 5	83	85	4.25	5	5.75	4.25	5	5.75	4.25	5	5.75	0.03	0.25	0.25	0.50	0.08	none	0.05	0.50	....
No. 6	82	83	6.25	7	7.75	6.25	7	7.75	2	3	....	0.03	0.25	0.25	0.50	0.08	none	0.05	0.50	....
SEMI-RED BRASS ALLOYS																				
No. 7	83	84	2.5	3	3.5	2.5	3	3.5	9	10	11	0.03	0.25	0.35	0.50	0.08	none	0.05	0.50	....
No. 8	82	83	3.25	4	4.75	5	6	7	5	7	....	0.03	0.25	0.35	0.50	0.08	none	0.05	0.50	....
No. 9	79	80	2.5	3	3.5	6.25	7	7.75	7.5	9.5	....	0.03	0.25	0.35	0.50	0.08	none	0.05	0.50	....
No. 10	77	78	2.5	3	3.5	4.25	5	5.75	11	13.5	....	0.03	0.25	0.35	0.50	0.08	none	0.05	0.50	....
YELLOW BRASS ALLOYS																				
No. 11	70	71	1	1.5	2	2	3	4	20	24	....	0.01	0.10	0.30	0.50	0.05	none	0.10	0.50	....
No. 12	67	69	0	0	1.5	2	3	4	25	27	....	0.01	0.10	0.30	0.50	0.05	none	0.10	0.50	....
No. 13	64	66	0	0	1	1	2	3	30	31	....	0.01	0.10	0.30	0.50	0.05	none	0.10	0.50	....
No. 14	60	62	0	0	1	1	2	3	30	35	....	0.01	0.10	0.30	0.50	0.05	0.50	0.10	1.00	....
HIGH LEAD ALLOYS																				
No. 15	84	85	4.25	5	5.75	8	9	10	0.5	1	2	0.01	0.25	0.25	0.50	0.08	none	0.03	....	0.50
No. 16	79	80	9	10	11	9	10	11			0.50	0.05*b*	0.50	0.25	0.25	0.08	none	0.03	....	0.50
No. 17	77	79.25	9	10	11	9	10	11	0.25	0.75	1	0.01	0.50	0.25	0.50	0.08	none	0.03	....	0.50
No. 18	72	73	7	8	9	13.5	15	16.5	1	1.5	2	0.05	1.00	0.25	0.50	0.08	none	0.03	....	0.50
No. 19	71	71.5	3.5	4.5	5.5	14	17	20	2	4	6	0.05	1.00	0.25	0.50	0.08	none	0.03	....	0.50
No. 20	70	70.5	5.23	6	6.75	18	20	22	0.5	1	1.5	0.05	1.00	0.25	0.50	0.08	none	0.03	....	0.50

a The term "none" as applied to aluminum allowance is defined as a maximum of 0.005 per cent when determined in accordance with section 5 of A.S.T.M. Tentative Specification B30-32T.

b Minimum.

Appendix

The data in the following tables do not constitute a part of these specifications. They are given merely to indicate to the purchaser the approximate physical properties of the various alloys specified, that may be expected of carefully manufactured alloys of the formulas indicated and to constitute a guide to the purchaser in selecting the alloy grade best suited for meeting the service conditions for which the ingot metal is to be used.

Alloy Grade	Tensile Strength, *a* Lb. Per Sq. In.	Elongation in 2 in. Per Cent	Reduction of Area, Per Cent	Compression Deformation Limit, *b* Lb. Per Sq. In.	Brinell Hardness (500 Kg. for 30 Seconds)	Pattern Maker's Allowance for Shrinkage, In. Per. Ft.	Weight, Lb. Per Cu. Ft.
BRONZE ALLOYS							
No. 1	30,000 to 40,000	15 to 30	15 to 30	.....	44 to 48	0.1875	535
No. 2	32,000 to 38,000	15 to 20	15 to 20	.....	55 to 65	0.1875	535
No. 3	30,000 to 36,000	25 to 30	25 to 30	.....	55 to 65	0.1875	535
RED BRASS ALLOYS							
No. 4	27,000 to 33,000	15 to 20	15 to 20	.....	50 to 60	0.1875	535
No. 5	27,000 to 33,000	15 to 20	15 to 20	.....	50 to 60	0.1875	535
No. 6	26,000 to 32,000	13 to 19	14 to 21	.....	50 to 60	0.1875	540
SEMI-RED BRASS ALLOYS							
No. 7	31,000 to 37,000	25 to 35	20 to 30	....	50 to 60	0.1875	535
No. 8	29,000 to 35,000	25 to 35	20 to 30	.....	40 to 50	0.1875	535
No. 9	22,000 to 28,000	10 to 15	10 to 15	.....	50 to 55	0.1875	540
No. 10	25,000 to 30,000	15 to 25	20 to 25	.....	45 to 55	0.1875	540

Alloy Grade	Tensile Strength *a* Lb. Per Sq. In.	Elongation in 2 in. Per Cent	Reduction of Area Per Cent	Compression Deformation Limit, *b* Lb. Per. Sq. In.	Brinell Hardness (500 Kg. for 30 Seconds)	Pattern Maker's Allowance for Shrinkage, In. Per Ft.	Weight, Lb. Per. Cu. Ft.
			YELLOW BRASS ALLOYS				
No. 11	30,000 to 35,000	35 to 45	25 to 35	.....	40 to 50	0.1875	535
No. 12	30,000 to 35,000	25 to 35	20 to 30	.....	40 to 50	0.1875	535
No. 13	30,000 to 35,000	25 to 35	20 to 30	.....	40 to 50	0.1875	533
No. 14	30,000 to 45,000	15 to 25	20 to 30	.....	40 to 50	0.250	500
			HIGH LEAD ALLOYS				
No. 15	25,000 to 31,000	8 to 13	7 to 13	12,000	45 to 55	0.1875	540
No. 16	27,000 to 33,000	7 to 12	8 to 13	12,500	47 to 52	0.1875	553
No. 17	27,000 to 33,000	7 to 10	7 to 12	12,500	47 to 52	0.1875	553
No. 18	25,000 to 30,000	11 to 17	10 to 16	12,000	45 to 50	0.1875	570
No. 19	25,000 to 30,000	10 to 15	7 to 13	12,000	47 to 52	0.1875	570
No. 20	22,000 to 27,000	10 to 16	7 to 13	11,000	42 to 47	0.1875	570

a The tension tests were made on test specimens taken from ingots, except Alloys Nos. 7 and 15, which were sand cast. Sand-cast test specimens would show somewhat lower values.

b The compression tests were made on machined test specimens (sand castings) of 1 sq. in. sectional area, 1 in. high. The compression deformation limit is taken as the load producing a compression in the specimen of 0.001 in.

Alloy Grade	EXAMPLES OF USE	FOUNDRY MANIPULATION	CHARACTERISTICS
		BRONZE ALLOYS	
No. 1	For valves and fittings for steam, gas, etc.	Requires careful foundry practice	Machines well
No. 2	Commercial bronze for high-duty bearings where wear resistance is essential	Requires careful foundry practice	Machines well
No. 3	Good-strength hard bronze for general service	Requires careful foundry practice	Machines well
		RED BRASS ALLOYS	
No. 4	High-grade red brass for general service	Foundry practice not difficult	Machines well
No. 5	Second-grade red brass for general service	Foundry practice not difficult	Machines well
No. 6	Auto fittings, carburetor parts	Foundry practice not difficult	Machines well
		SEMI-RED BRASS ALLOYS	
No. 7	Catenary fittings, overhead fittings Electric Railways; very resistant to atmospheric corrosion	Foundry practice not difficult	Machines well
No. 8.	Reddish yellow alloy for air, gas and water fittings	Foundry practice not difficult	Machines well
No. 9	Valve fittings for low pressure	Foundry practice not difficult	Machines well
No. 10	Yellowish red alloy for air, gas and water fittings	Foundry practice not difficult	Machines well
		YELLOW BRASS ALLOYS	
No. 11	Yellowish red alloy for plumbers' fittings	Foundry practice not difficult	Machines well
No. 12	Yellow brass for light castings and ornamental work not requiring strength or subjected to internal pressure	Foundry practice not difficult	Machines well
No. 13	Yellow brass for heavier castings	Foundry practice not difficult	Machines well
No. 14	Plumbers' flanges, scupper pipes, etc.	Very difficult. Aluminum up to 0.30 per cent improves casting properties, but increases shrinkage	Hard to machine. Not suitable for bearings or water pressure fittings
		HIGH LEAD ALLOYS	
No. 15	Small bearings such as automobile bearings and bushings, machined by broaching	Foundry practice not difficult	Machines easily
No. 16	Bearings for heavy pressure. Not machines by broaching	Foundry practice not difficult	Machines easily
No. 17	Hard bearing metal for small bushings, to be machined by broaching, harder than No. 15	Foundry practice not difficult	Machines easily
No. 18	Locomotive engine castings and general service bearings for moderate pressure	Foundry practice not difficult	Machines easily
No. 19	Car journal bearings and similar service	Foundry practice not difficult	Machines easily
No. 20	Bearings operated at high speed and under light or medium pressure	Foundry practice not difficult	Machines easily

Specifications for Copper

of the American Society for Testing Materials

Lake Copper:
Copper, 99.900%, Silver being counted as Copper.

Electrolytic Copper:
Copper, 99.900%, Silver being counted as Copper.

Fire-Refined Copper Other Than Lake:

	Per Cent
Copper and Silver, minimum	99.700
Arsenic, maximum	0.100
Antimony, maximum	0.012
Bismuth, maximum	0.002
Iron, maximum	0.010
Lead, maximum	0.010
Nickel, maximum	0.100
Oxygen, maximum	0.075
Selenium, maximum	0.040
Tellerium, maximum	0.014
Tin, maximum	0.050

Editorial Comment

Secondary Metals—A Huge Industry

THE recent meeting of the National Association of Waste Material Dealers in New York, reported on page 151 of this issue served to emphasize above all things, one fact—that secondary metal reclamation has grown to be one of our huge basic industries. Nowhere was this condition made more clear than in the paper by E. W. Pehrson of the United States Bureau of Mines, delivered at that meeting.

The value of metals reclaimed annually from scrap now rivals virgin metals won from the ground. The World War added greatly to the prestige of secondary metals. When the facilities for primary metals were taxed to the limit, secondary metals were enlisted and made good. No small factor in their improvement was the technical control which has been introduced by many of the larger smelters, enabling them to produce better and more consistent quality ingots. Today, even the large producers of primary metals use huge quantities of scrap for their intake.

The value of secondary metals is now somewhere around one billion dollars per year. Of course this includes every imaginable source and division, including iron and steel to over half of the total; nonferrous industrial metals, 40 per cent; gold, silver, platinum, etc. Also it includes material returned directly by manufacturers to the mills which produced their metal. It seems to be a fact, moreover, that secondary output is increasing faster than primary. Scrap copper rose from 8 per cent of the primary output in 1909 to 162 per cent in 1934; lead from 12 per cent to 86 per cent; zinc, while it has been almost stationary at about 25 per cent, will rise soon because of the increasing supplies of die casting scrap.

The industry has many problems, internal and external. It needs improvement in sorting and grading; it needs still better technical control; it needs improvement in business practices. But it has definitely arrived so far as size is concerned, and this has brought with it a realization of the importance and fundamental dignity of the industry. Eventually the backward elements must catch up.

Takes Time Off

EVERY forward-looking man of business knows it is just as important to get away from his desk occasionally as it is to stay and attend to business. Not only does he catch his breath, get a needed rest and get a fresher view of his situation, but he may actually learn more of value away from the job a short time, than by keeping his nose to the grindstone.

Opportunities for such relief coupled with a chance actually to improve business are before the foundryman and plater at this time. The leading article of this issue describes the plans for the coming convention of the American Foundrymen's Association to be held in Detroit, May 4-9. We have said many times in the past and we shall go on saying it without hesitation in the present and the future, that no progressive foundryman can afford to miss these meetings and discussions of technical problems and the exhibits of the foundry equipment and supplies. This is the ideal combination of getting away from the grindstone and also doing one's business some good.

The convention of the American Electro-Platers' Society will be held in Cleveland, Ohio, June 1-4. Our next issue will give in full, the arrangements for this convention. All that we need to say now is—**reserve the time and go without fail.**

The Business Situation

AFTER a splendid Fall season and a normal winter recession, we are now faced with the fact that Spring is here and that business should be increasing fairly rapidly. From reports throughout the country at large, however, it seems that the pick-up is slow. Volume of operations is not increasing as fast as it should, based on comparison with last winter. Certain industries are doing rather well. The motor industry is busy, taking with it steel and a number of other suppliers. Electric power production has held up to good levels. Other fields, however, have not.

Nevertheless, there seems to be a high degree of optimism. According to the Business Bulletin of the Cleveland Trust Company, the security markets have furnished during recent weeks several significant reflections of the high degree of prevailing business confidence. In their opinion this is of more genuine importance than the current reports of production and trade which have been showing declines. Perhaps said declines were caused by the unusually severe winter and latterly by the disastrous floods.

We hope so. We have a high regard for business confidence. We have, however, a higher regard for orders and we hope that they will follow soon.

Good Resolutions

IT MAY seem late for New Year's resolutions, but to our mind, it is never to late for a good one. For that reason we reprint below a "Manufacturer's New Year's Resolutions," published in the British Jeweler of Birmingham, England, which speaks for itself:

> "I will never sell at less than cost and delude myself, because I am busy, into believing that I am making a fortune.
>
> "I will not abuse the man who beats me down on price to the last halfpenny and then go and bully someone else into selling me stuff at what I know is a suicidally low figure.
>
> "I will not complain of bad trade while I continue to make stuff that was out of date twenty years ago—which I don't even advertise.
>
> "I will not suggest that every man who beats me in a business deal is an unscrupulous mountebank, but I will reflect coolly that there may be more accomplished salesmen than I and manufacturing methods which are more modern and economical than mine.
>
> "And before I censure again the price-cutters who are sucking the life-blood from the trade, I will reflect that the cheap sideline I offer buyers as a bait is somebody's else's bread and butter.
>
> "But since I am blessed with so unique a capacity for deafness to the voice of concience, I do not anticipate that my business will suffer at all in 1936. Good resolutions are notoriously short-lived!"

Correspondence and Discussion

How Foundrymen Like the Brass Founders' Manual. Opinions of Readers from Large and Small Organizations.

After receiving our first copy of the **Metal Industry,** we were thoughly convinced that it is the only publication on the market today that speaks in our, the foundryman's language.

We have in the past subscribed for other magazines pertaining to the foundry practice and found them not only hard to understand, but they were unable to answer our questions satisfactorily.

Our problems of today are much different than in the past and we must be alert and willing to learn new methods. The **Metal Industry** in our estimation can teach us the new ideas that are more practical, if we must say more efficient than our old schooling.

ADVANCE ALUMINUM & BRASS CO.
Robt. R. Haley.
Los Angeles, Calif.

Acknowledging with thanks receipt of Brass Founders' Manual, and find that it contains very valuable and useful information.

BELL BROTHERS.
A. W. Bell.
Pittsburgh, Pa.

Thanks very much for having sent me your "Brass Founders' Manual," which I find very enlightening and interesting enough to ask you, to also send it to our Superintendent and our Foundry Foreman.

CORONA CORPORATION.
Martin Thurnauer.
Jersey City, N. J.

We wish to thank you for your letter of January 29 and also the copy of your new Brass Founders' Manual.

Would like to state this Manual contains a great deal of practical information and has proved very useful.

THE TURNER BRASS WORKS.
J. H. Joseph.
Sycamore, Ill.

We wish to acknowledge the receipt of one copy of Brass Founders' Manual —1935 edition—and would advise that we find this a very interesting book. We would like to obtain three extra copies which we will be very glad to pay for, if you will advise us the cost.

CORBIN CABINET LOCK COMPANY
E. B. Stone.
New Britain, Conn.

Thank you for sending us copy of your Brass Founders' Manual for 1935. This is an excellent piece of work.

FEDERATED METALS CORPORATION.
E. L. Rimbault.
New York, N. Y.

We are enclosing our check for $1.00 together with your card properly filled in, for which please send us your **Metal Industry** for ten months.

If it is in order for us to get a couple more copies of the Brass Founders' Manual gratis, we shall appreciate them but we do not wish to impose on your generosity beyond what you consider reasonable and shall not object if you do not feel it proper to send them. We found this Brass Founders' Manual very interesting and believe it will be quite useful.

ALBERT and J. M. ANDERSON MFG. COMPANY.
M. R. Jordan.
Boston, Mass.

We appreciate your sending us copy of your new Brass Founders' Manual, which we have found to be of considerable interest.

TENNESSEE COAL, IRON and RAILROAD COMPANY.
Richard Shively.
Birmingham, Ala.

We have received the 1935 edition of Brass Founders' Manual. We found this publication very illuminating and would like, if possible, to obtain three copies of the 1936 edition.

We are particularly interested in the methods, materials and new equipment for a small bronze foundry.

HERRESHOFF MANUFACTURING COMPANY.
C. W. Haffenreffer.
Bristol, R. I.

We thank you for your recent letter and the copy of the Brass Founders' Manual.

This book has proved to be of great practical value in our foundry and we are returning your slip with the names of men who could make real use of copies of it.

CONSOLIDATED MINING and SMELTING COMPANY OF CANADA, LTD.
F. H. Chapman.
Trail, B. C.

The writer wishes to state that though he is young as a foundryman, he believes that this booklet is the best means of waking up the average foundryman to the fact that there is a lot to learn and there are a lot of interesting things in the foundry. Too many of our practical foundrymen run their places the way their forerunners or former bosses have. A booklet as the Brass Founders' Manual will go a long way to bring about a more critical state of mind. Another point is the fact that the book is devoted entirely to the brass industry. I have heard the complaint many times that the only information one gets on brass is several small chapters at the end of an iron or steel book.

UNION BRASS and METAL MFG. COMPANY.
Fred J. Kaim.
St. Paul, Minn.

I appreciate the additional copies of Brass Founders' Manual. This booklet is very interesting and of practical value. I believe if the contents were extended to say 100 pages and you were to touch upon the subject of how to prevent, or the causes of, certain foundry difficulties, in a general way, it would make a very valuable text book of which the nonferrous foundries are in real need.

TABER PUMP COMPANY.
Wm. F. Traudt
Buffalo, N. Y.

The Brass Founders' Manual has come to hand and I appreciate very much your kindness in forwarding me two copies.

I find it very interesting and a real job. The authors are to be congratulated.

LUMEN BEARING COMPANY.
N. K. B. Patch.
Buffalo, N. Y.

Thank you for the copy of the new Brass Founders' Manual which we received some time ago. This has been very useful to us.

We have filled out the attached form and would appreciate your sending copies of this Manual to the persons named.

KEELER BRASS COMPANY.
C. M. Hough.
Grand Rapids, Mich.

New Books

Uses of Non-Ferrous Metals, edited by Dr. C. H. Mathewson. Published by American Institute of Mining and Metallurgical Engineers. Size 5½ x 8; 427 pages. Price $3.00.

Here for the first time is a comprehensive survey of the non-ferrous metallurgical industries from the standpoint of the consumer rather than the producer. Not that the subject of production is omitted; it is simply not stressed, the emphasis of the book being on the avenues of consumption.

Obviously no such book can be authoritatively covered by one person. The editor, **Professor C. H. Mathewson** of Yale University, has been assisted by specialists in other fields, including such widely known figures as **F. M. Pecket, F. C. Frary, Zay Jeffries, J. A. Gann, J. E. Harris, P. D. Merica, W. M. Peirce** and others. The metals covered are aluminum, arsenic, antimony, bismuth, chromium, cobalt, copper, gold, lead, magnesium, molybdenum, nickel, platinum (and its metals), quicksilver, selenium and tellurium, silver, tantalum and columbium, tin, tungsten, zinc and cadmium, and the miscellaneous alloy-forming elements such as beryllium, calcium, cerium, lithium, manganese, titanium, vanadium, and zirconium. Each metal is described from the ground up to the consumer, with, as stated above, emphasis on the consumer. In other words, the book tells where the metal comes from, how it is processed, where it goes, finally, and how it is used.

Necessarily, the space allotted to each metal must be short or the book could not possibly stay within the bound of two covers. Nevertheless, no subject has been "skimped." The authors are brief, and in most cases restricted to fundamentals but the book is clear and all-inclusive.

This book is the first of its kind. We hope there will be others going into greater detail. At this time the book is, we believe, indispensable to everybody interested in metals, and no matter how many more books are written, it will always have its place.

Book of A.S.T.M. Tentative Standards for 1935. Size 6 x 9; 1,591 pages. Published by American Society for Testing Materials. Price $7-$8 depending upon binding.

The triennial publication of the A.S.T.M.; a companion volume to the Book of Standards. This volume contains the tentative standards for ferrous metals, non-ferrous metals non-metallic materials, miscellaneous materials, general testing methods and tentative revisions of the A.S.T.M. Standards.

Metallurgical Dialogue, by Albert Sauveur. Published by the American Society for Metals. Size 5½ x 8; 166 pages. Price $3.00.

This book presents an imaginary interview between the Dean of American metallurgists and a typical Harvard undergraduate. It involves a spirited discussion of such topics as Hysteresis, Ferrite, Alloy Steels, Manganese, Creep, Corrosion etc.

No living American is qualified to write with more authority than Dr. Sauveur. The book is necessarily written in simple, elementary terms, essentially for the student. It makes fascinating reading, however, for anyone interested in any way in metals, whether he be foundry foreman, metal salesman, metallurgist or plant owner.

Practical Handbook on Electroplating. Published by W. Canning and Company, Ltd., Birmingham, England. Size 6 x 9; 344 pages. Price $1.00.

This is the 12th edition of a book which might be termed part catalog but largely technical. It covers electroplating, polishing, bronzing, lacquering and enameling. It is thoroughly practical in character and written in such a way as to make it extremely useful for the beginner in the electroplating field.

Minerals Year Book for 1935. Published by the Bureau of Mines, Washington, D. C. Size 6 x 9; 1,293 pages. Price $2.00. Obtainable from the Superintendent of Documents, Washington, D. C.

This book covers the production of metals in the United States; ferrous, non-ferrous, precious and rare, and also metallic minerals. It is the standard reference work for the economics of the American mineral industry.

Alexander Federal Tax Course and Guide. Published by the Alexander Publishing Company. Size 6½ x 9, about 1,000 pages. Price $7.50.

In these days of variegated and multifarious taxes, even the small business man finds himself in need of a reference work to which he can turn for quick information. This book is intended to act as such a guide. It covers the Federal tax laws of 1934 and 1935; the official Treasury Department regulations, specimen tax returns, problems and answers. A special section devoted to what is called the Tax Course; 250 pages of explanation of the laws. Information is given on payroll taxes, income taxes, etc.

The book is conveniently indexed in its different sections.

Symposium on Spectrographic Analysis. Published by The American Society for Testing Materials. Size 6 x 9, paper bound, 51 pages. Price 65 cents.

A reprint from the proceedings of the A.S.T.M. of a Symposium which was held at the 1935 annual meeting. The papers included this Symposium, cover spectrographic analysis of platinum, magnesium, cadmium and other non-ferrous metals and alloys.

Methods of Colorimetric Analysis, by Dr. F. D. Snell and Dr. Cornelia T. Snell. Published by D. Van Nostrand Company. Size 6 x 9, 870 pages. Price $9.50.

This book, it is stated, gives the complete details of thousands of methods of analysis and explains the variations of the basic methods in order to facilitate the selection of the proper procedure for the particular material to be analyzed. Profusely illustrated. A more extended review will be published in one of our coming issues.

Custom House Guide. An importer's encyclopedia. Published by Custom House Guide, American Import and Export Bulletin, Box 7, Station P, Custom House, New York. Price $10.00.

This is the 1936 edition (74th year) which includes the new U. S. tariff rates just issued, and the nine reciprocal trade agreements affecting 482 commodities from 83 countries. Approximately 60,000 changes have been made in the volume since the 1935 edition, according to the publishers.

Government Publications

Bibliography on Foreman Improvement. A selected and annotated list of references including books, pamphlets and magazine articles. Revised, 1935. Vocational Education Bulletin No. 128, Trade and Industrial Series No. 35. U. S. Department of the Interior. For sale by Superintendent of Documents, Washington, D. C. Price 5 cents.

Carbon Brushes (Carbon, Graphite and Metal-Graphite) Brush Shunts. Simplified Practice Recommendation R56-35. Supersedes R56-28. National Bureau of Standards. For sale by Superintendent of Documents, Washington, D. C. Price 5 cents.

Preparing Shipments to Europe. Trade Promotion Series No. 158 (Exporters' Handbook). Obtainable from the Superintendent of Documents, Washington, D. C. Price 15 cents.

Proposed Federal Specifications for Valves, Bronze; Angle and Globe, 150-Pound S.W.P. Second Resubmission. Copies obtainable from Federal Specifications Division, Room 751, Federal Warehouse, 9th & D Streets, Washington, D. C.

Proposed Revision of Federal Specifications for General Inspection of Metals. Copies obtainable from Federal Specifications Division, Room 751, Federal Warehouse, 9th & D Streets, Washington, D. C.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

METALLURGICAL, FOUNDRY, ROLLING MILL, MECHANICAL, ELECTRO-PLATING, POLISHING, AND METAL FINISHING

ASSOCIATE EDITORS

H. M. ST. JOHN W. J. PETTIS W. J. REARDON W. B. FRANCIS
G. BYRON HOGABOOM T. H. CHAMBERLAIN WALTER FRAINE

Cleaning Aluminum—Chrome on Grilles—Spacing Buffs

Q.—(1) How to remove black from ice cube trays before nickel plating.

(2) Trouble getting chrome on fins of a radiator grille.

(3) How to pad an ordinary buff to keep it from burning when buffing pipe.

A.—(1) If ice trays are aluminum, put in weak caustic soda solution (2 ozs./gal.) for a few seconds, remove, rinse in water, pass through 5% nitric acid, or a brass bright dip (nitric, sulphuric, water, 1:1:1: by vol.) Repeat until all black is removed.

Anodizing is best way to protect aluminum. Would not advise tinning.

(2) In chrome plating grilles the anode spacing must be equal, that is, an anode in front and an anode in rear of the grille. The distance of each should be such that there will be a nearly equal potential all over the grille. If anode is used on one side only or there is a greater distance from one than from the other, the side of the grille having the lowest potential, and therefore the lowest current, will not receive a chrome deposit.

(3) Buffs can be spaced by using one or two small discs between each pair of discs of a full disc buff. On a 16" buff use 8" discs from a worn buff, and smaller buffs can be separated in a similar way, by still smaller worn discs. The speed of lathe is a factor here and also quality of composition. A dry composition is not advisable here. A greasy composition will keep buff and work moist and result in less heating.

—G. B. H., Jr., Problem 5,478.

Gassy Castings

Q.—We are enclosing a few samples of brass castings which as you see are full of steam or gas pockets. We would appreciate information as to how you think the difficulty can be overcome.

We might add, so that you will have a fuller background to work on, that these castings were cast in Albany No. 1, moisture content about 6%, squeeze molded to about 25 lbs., poured out of ingot metal, deoxidized with aluminum. You can see how they were gated from the samples enclosed. The molds were tilted about 15 degrees away from the gate that is poured down hill. The pouring temperature on these has been held as low as consistent with the running of castings, although we have the same difficulty when we use extremely hot metal. Any information you can give us will be greatly appreciated.

A.—On examination of the sample casting submitted, in our opinion the defect is due to the condition of the sand due to the extreme lightness of the casting. Any uneven mixture of the sand causes wet spots or hard spots in ramming and causes the metal to jump, and due to its lightness the metal is set and will not unite with the metal being poured in the casting, causing a "blow" as it is called; or if the gas that is formed by the hot metal and smoke from such metal is unable to escape it will also cause blows.

The remedy is to aerate your sand. There are a number of such machines on the market that screen, cut and aerate your sand in one operation. There is also on the market a moisture meter for taking moisture readings that has proven very useful in sand control.

Also, would suggest that you draw vents from the far end of the casting to the edge of the flask. This will help the gas to escape and improve the running of the castings.

—W. J. R., Problem 5,479.

Nickel For Cold Rolled Steel

Q.—Wants formula for nickel solution for cold rolled steel stampings. All nickel is chromium plated.

A.—A good formula for a cold nickel solution is:

Single nickel salts	12 ozs./gal.
Double nickel salts	4 ozs./gal.
Ammonium chloride	3 ozs./gal.
Boric acid	3 ozs./gal.
pH	5.8 to 6.0

Formula for a hot nickel solution:

Single nickel sales	27 ozs./gal.
Nickel chloride	6 ozs./gal.
Boric acid	4 ozs./gal.
pH	5.8 to 6.0
Temperature	130 to 140 deg. F.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name ..... **Class of work being plated:** .....

Address ..... **Volume used:** .....

Employed by: ..... **Solution depth:** .....

Kind of solution: ..... **Cathode surface, sq. ft.:** .....

Tank length: ..... **width:** ..... **Kind of anodes:** .....

Anode surface, sq. ft.: ..... **Distance from cathode** ..... **Original formula of solution:** .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible. Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

On the cold solution an average current density of 10 amps. per sq. ft. will take care of most classes of work.

On the hot nickel solution about twice this density can be used.

Use only single nickel salts in replenishing the metal content of the above solutions.

Do not use any ammonium salts or sodium salts in the hot nickel solution.

—G. B. H., Jr., Problem 5,480.

Pouring Antimonial Lead

Q.—We are using lead—95, antimony —5 in bronze molds. Please advise the best pouring heat. The finished articles will be sprayed in paint and some will be splashed with silver. Any further information you can give will be greatly appreciated.

A.—We would advise approximately 650° Fahr. However, this will depend upon the work you are doing. If you find any trouble in running your article increase the temperature to 700° Fahr. A good thing to remember is that increasing the antimony up to 10% increases the fluidity of the metal as you increase the antimony up to that point.

—W. J. R., Problem 5,481.

Preventing Lead Sweat

Q.—We are making castings to the following specifications:

Copper	77%
Tin	8%
Lead	15%

We are having quite a bit of trouble with the lead sweating. We also find that in many of these castings the lead has segregated leaving a porous surface after the casting has been finished. The castings weigh from 5 to 200 pounds each.

Can you give us any information which will assist us in overcoming these troubles?

A.—To overcome the segregation of the lead we suggest that you refine your lead before using, by melting the lead in a separate pot, and add 5% oxide of lead and 5% ground glass. Pole the metal well by inserting old leather to the bottom of the pot and let the metal boil. All impurities run to the top and can be skimmed off.

When the lead metal is refined pour into ingot and use as required, and you will overcome your trouble.

Another method, possibly not as much trouble, is to add ½ of one per cent of 30% Manganese Copper. This, also, will greatly reduce your difficulty.

—W. J. R., Problem 5,482.

Red Surface on Cast Brass

Q.—In reviewing your Brass Founders' Manual, we note quite a lot of information in it regarding the melting and mixture of non-ferrous metals. We would like to ask if you can inform us how to make yellow brass flare red on the surface, as we have run across a good deal of this work but were never able to accomplish it. What method is used to make yellow brass appear red on the outside and which color remains with the casting as a permanent rough finish?

A.—The color you speak of on the outer surface of the brass casting is obtained by the mixture of the alloy. Such work generally consists of:

74 to 80 copper
4 to 6 lead
Balance zinc.

A mixture we have found very good in this respect, consists of:

80 copper
14 zinc
6 lead

Use good material or purchase ingot of this composition. It is very hard to control the color if miscellaneous scrap is used. If a stronger alloy is desired add 1% tin and take out copper.

—W. J. R., Problem 5,483.

Removing Fire Scale From Bronze

Q.—I am very much interested in the methods of removal of fire scale from sheet bronze material preparatory to oxidizing and other methods of finishing. Of course I have tried and used nitric acid pickles and the regular bright dips but would like to know if there are any other methods easier to apply and cheaper to use.

Recently I experimented with an electrolytic descaler made up of 6 ozs./gal. sodium cyanide, used warm with lead anodes and using reverse current, and had very poor results. The work would come clean at times but at other times it would get very black and would have to be bright dipped to remove this black film.

It is desired to put this fire scale removal on a production basis. The parts are small and have to be handled in baskets and some of them have cavities which hold the acid and consequently drag out a large amount which makes it an expensive process.

A.—Bronze can be pickled in an 8% solution of sulphuric acid to which 2 ozs./gal. of sodium dichromate has been added. Heat to 180 deg. F. This will remove most of the scale.

Follow with a bright dip to get a good surface.

A preliminary dip in nitric acid may be necessary as some of the oxide scale on the bronze may have been reduced to metallic copper which is not soluble in the above pickle, or in a bright dip. This copper can only be removed by nitric acid.

Much of the trouble you are having may be corrected by attention to the annealing operation.

—G. B. H., Jr., Problem 5,484.

Rough Nickel

Q.—We are sending you under separate cover sample of a shear blade. On this sample you will note that we have placed two pencil marks on the handle of the shear. Kindly examine the surface between these two pencil marks and you will note that there is a roughness which looks almost like pitted nickel. We do not believe that this is pitted nickel and would appreciate having you advise us what it is and if possible, what to do to remedy it.

A.—The defect on the blade you submitted is not pitting.

Under the glass it can be seen that the roughness is due to solid particles settling on the work.

This can be proven by the fact that all surfaces of the blade which are more or less horizontal have some roughness. In other words the suspended matter in the solution is simply settling on the work where it clings and receives a deposit of nickel that coats over it.

You will find that even the end of the point is rough due to this cause. Also the inside bottom surface of the handle.

It will be necessary to filter this solution. Also it would be wise to keep the anodes bagged.

If it is not possible to filter the solution the greatest care should be exercised so as not to disturb the mud at the bottom of the tank when hanging in and taking out. Some particles, however, will become suspended and electrified so that they will float over to the work regardless of how little agitation is occurring.

—G. B. H., Jr., Problem 5,485.

Smoking Molds For Bronze

Q.—Will you please inform us of the procedure in smoking a mold to produce fine, smooth castings in bronze. We have a job to figure on and they inform us that it is a small bronze casting so that it can be used for molds. A sand mold must be smoked and it will then produce a really smooth casting.

A.—One of the best methods used to smoke molds is to procure a tank of acetylene gas. You can smoke your molds very quickly and evenly. Turn on the gas and regulate to the smoke you require through the burner that is used for welding.

—W. J. R., Problem 5,486.

Yellow, Bright Gold

Q.—I would be obliged if you would tell me the full particulars on bright gold plating chalices; also the length of time they are left in the solution.

A.—The following formula will produce a bright yellow gold deposit:

Sodium gold cyanide	½ oz.
Sodium cyanide	1-1½ oz.
Sodium phosphate	2 oz.
Water	1 gal.
Temperature	120-140 deg. F.
Anodes	stainless steel
Voltage	2½

Solution should be thoroughly mixed and heated before using. All ingredients mentioned are water soluble and commercially available. If extremely heavy deposits of gold are required it will be necessary to color deposit after plating to obtain bright finish. Several deposits of 5 minutes each may be required. Coloring may be done with a 6" cotton flannel wheel at 1700 R.P.M. with red gold coloring rouge.

—T. H. C., Problem 5,487.

Practical Brass Foundry Digest

By H. M. ST. JOHN
Chief Metallurgist, Detroit Lubricator Company; Associate Editor, Metal Industry.

Short Abstracts of Articles of Interest to Practical Non-Ferrous Foundrymen and Metallurgists.

Uses and Limitations of the Spectrograph for Industrial Control. Thomas A. Wright. Metal Progress, Vol. 29, page 53 (January, 1936).

The use of the spectrograph is rapidly increasing as a cheap means for making rapid quantitative determinations of elements which are present in relatively small proportions. Its greatest application is in the determination of metals which make up 5% or less of the alloy, at an accuracy of one-tenth to one-fifth of the total amount present. Minute quantities of impurities can readily be determined.

Characteristics of Nickel-Silver Alloys. Anon. Metal Industry (London). Vol. 48, page 3 (Jan. 3rd, 1936).

General information on the properties and applications of nickel-copper-zinc alloys taken from a booklet issued by Henry Wiggin & Co., Ltd.

Quantitative Analysis of Non-Ferrous Alloys by Spectroscopic Methods. R. A. Wolfe. Metal Industry (London), Vol. 47, page 633 (Dec. 27th, 1935).

A paper contributed to a symposium of the American Society for Testing Materials. The method of Duffendack, Wolfe and Smith was used in obtaining the data given. An electric arc was employed but a spark source may be used. For any given type of analysis a working curve is prepared by photographing the spectral lines of a series of known samples over the range of composition it is desired to determine. The intensity of the lines is plotted against the known composition. Once prepared this curve may be used indefinitely without further reference to standard samples. The spectrum of the unknown sample is photographed and the intensity of the lines compared with the working curve; the percentage of the desired constituent is read directly from the curve. Curves are given for the determination of one to 5% aluminum in nickel alloys, 0.05 to 0.005 magnesium in zinc alloys, 0.02 to 0.22 barium in barium-nickel and barium-copper-nickel alloys, 0.1 to 1.2% chromium in nickel. The accuracy of the method is about plus or minus 5% of the quantity of unknown element actually present. At least 10 exposures can be made on a single photographic plate and several elements can be determined in each exposure. Judgment on the part of the observer is not required. Analyses can be made in 15 mins. or less.

Recent Developments in Refractories. C. E. Moore. Metal Industry (London), Vol. 48, page 8 (Jan. 3rd, 1936).

A rather general paper given before the Midland Metallurgical Societies. There has been a growing demand for increased percentages of alumina in fireclay bricks, resulting in greater refractoriness, less spalling, and greater resistance to attack by slags containing metallic oxides. Brick made from the sillimanite minerals are becoming popular. All are converted into mullite when burned. About 30% clay is generally used in the mixture. Electric fusion of clay-bauxite mixtures, with casting in sand molds, produces brick which are of exceptional quality but costly. Porous brick of fire clay are being produced for insulating purposes by mixing the clay with carbonaceous material which burns out during firing. These are not as good insulators as brick made from diatomaceous earth but are far superior in strength and refractoriness. Refractory cements, silica bricks, magnesite bricks and refractory products made from chromite, carborundum, siloxicon, zircon, zirconia, and beryllia are also briefly considered.

Recent Developments in Refractories. Metal Industry (London), Vol. 48, page 36. (Jan. 10th, 1936).

A discussion of Moore's paper. (See abstract above).

The Nickel Industry in 1935. Robert C. Stanley. Metal Industry (London), Vol. 48, page 32. (Jan. 10th, 1936).

The use of small percentages of nickel in bronze castings to improve mechanical properties, and in high-lead bronzes to prevent lead sweat, has continued to gain ground. New monel alloys of the "K" and "S" series have made possible castings having non-galling characteristics at high temperatures accompanied by greater hardness and resistance to wear.

Quantitative Spectrographic Analysis of Magnesium Alloys for Manganese and Silicon. J. S. Owens and **T. M. Hess.** Metal Industry (London), Vol. 48, page 38, (Jan. 10th, 1936).

A contribution to the symposium held by the American Society for Testing Materials. The article gives additional information regarding the use of this valuable method of metallurgical analysis and is of wider interest than the title indicates.

Industrial Health Hazards and Employer Responsibility. W. J. McConnell. Trans. Amer. Foundrymen's Assoc., Vol. VII, page 161 (Feb. 1936). Discussion, on page 180.

Industrial Health Hazards and Employer Responsibility. Donald E. Cummings. Trans. Amer. Foundrymen's Assoc., Vol. VII, page 166 (Feb. 1936). Discussion on page 180.

Foundry operations induce only a modified silicosis, quite different from the acute type, since much of the dust inhaled by the workmen is inert. A real danger exists in cases of arrested tuberculosis. Men over thirty who have normal chests and those with uncomplicated occupational fibrosis may safely be employed in any foundry occupation. Men under thirty should not be exposed to the most hazardous dust conditions and should be examined frequently.

Physical Properties of Tin Base Bearing Alloys (Babbitt). Owen W. Ellis. Metal Progress, Vol. 29, page 56 (Feb. 1936).

Alloys of tin, antimony and copper, to which as much as 30% lead is sometimes added, serve principally as bearing linings but are sometimes used for die castings. Several A.S.T.M. and S.A.E. specifications are given. For bearing work cadmium is known to be a valuable addition and nickel has been recommended. Zinc and aluminum must be absent, while arsenic, bismuth and iron are objectionable. Copper increases both hardness and strength but for severe service at high temperatures should not exceed 3½%.

Modern Equipment

New and Useful Devices, Metals, Machinery and Supplies.

Variable Speed Lathe

Below is a picture of the type RV Variable Speed Polishing and Buffing Lathe made by the Hammond Machinery Builders, Kalamazoo, Michigan.

With this lathe, it is stated, the user can wear buffing wheels from the largest diameter to scrap size and maintain constant peripheral speed insuring utmost economy by increasing the life of wheels before discarding.

Only a minute is required to change speeds, and any speed within a 50% increase of the low speed can be had. As an example, 2,000 to 3,000 RPM, 1800 to 2700 RPM. A speed can be increased or decreased 25 revolutions at a time if desired.

The Variable Speed Lathe incorporates the same general features as the Hammond Rite-Speed Polishing and Buffing Lathes. Further specifications may be had from the Hammond Machinery Builders, Kalamazoo, Michigan.

Variable Speed Lathe

Remote Valve Control

To supplement automatic control systems, The Foxboro Company, Foxboro, Mass., developed recently the new Remote Valve Control. In many processes, automatic controllers stabilize the operation to such an extent that many non-critical flows may be governed by hand valves, which need be readjusted very infrequently. However, if these hand valves are not easily accessible, it is only natural that even the few necessary adjustments will be neglected. Where these conditions exist, a Foxboro Remote Valve Control mounted on a centrally-located panel enables the operator to adjust manually the degree of opening of an out-of-the-way, inaccessible valve without moving from his station. With it, he can reset a valve several hundred feet away to control temperature, pressure, flow or liquid level using readings from his recording instruments to guide him in making the correct adjustments.

A feature claimed for this Remote Valve Control is the extreme precision of valve setting. It is easy to make a change in pressure on the diaphragm motor of the controlled valve as small as ¼" of water or less. This means

(Continued on Page 148)

Remote Valve Control

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Improved Electric Fan. New design and construction which, it is claimed, makes the fan absolutely safe. Blades made of tough, molded rubber. Samson-United Corporation, Rochester, N. Y.

"Zip-Lift." New light electric hoist with capacity from 250 to 500 pounds. Harnischfeger Corporation, Milwaukee, Wisc.

"Mezurall" Tape Rule; an all purpose 6-foot steel tape rule. The Lufkin Rule Company, Saginaw, Mich.

Small Woodworking Machines. A new line of machines for shop and home use. Yates-American Machine Company, Beloit, Wisc.

Mechanical All Steel Rivet. Can be inserted and operated from only one side of the job with a wrench, giving the strength of a regular bolt or rivet. Multi-Seal Manufacturing Company, 123 N. Jefferson Street, Chicago, Ill.

Underneath Belt Motor Drive on the New 1936 Model 9-inch "Workshop" Lathe. South Bend Lathe Works, 425 E. Madison Street, South Bend, Ind.

New 75-Ampere Vertical Welder with Stable Arc. Harnischfeger Corporation, Milwaukee, Wisc.

Non-Lubricated Heavy Duty Flexible Coupling. Designated as L-R Type "W." Lovejoy Tool Works, 4971 W. Lake Street, Chicago, Ill.

New Splint for First-Aid Treatment of Broken Legs. Davis Emergency Equipment Company, Inc., 55 Van Dam Street, New York.

that the valve opening can be altered by as little as a few thousandths of an inch to produce the exact desired flow of controlled medium. Used in conjunction with a Stabilflo valve, the controlled flow can be changed by less than 1%. Due to its original unique design, there is no pumping or vibrating; air pressure on the diaphragm is held exactly at the desired setting.

Simplicity and ruggedness are said to mark both the design and construction of the Foxboro Remote Valve Control. Finished in lacquered cast bronze trimmed with buff nickel, it is a fitting addition to any instrument panel.

Mullite Refractories

The Mullite Refractories Company, Shelton, Conn., are the manufacturers of "Shamva" Mullite, a super refractory for use with temperatures up to 3300° F. Mullite is obtained by calcining or firing one of the sillimanite group of three anhydrous aluminum silicates, kyanite, anadalusite or sillimanite.

The properties given for "Shamva" Mullite are as follows:

1. A high softening point.
2. A low-coefficient of expansion and contraction.
3. Indifference to thermal shock.
4. Imperviousness to slag erosion.
5. Negligible tendency to vitrify.
6. Ample load-bearing capacity.
7. Chemical neutrality.

This refractory is made in a wide variety of standard brick shapes, and is also obtainable in many special shapes. It can be supplied in the form of cements such as mortar cement, dry patching cement, plastic patching cement and ramming cement. It is recommended for crucible and open flame furnaces, electric furnaces, enameling furnaces, annealing furnaces. An illustrated catalog will be sent on request.

The Jetal Process

In our March issue on page 112, we published a description of the Jetal process developed by the Alrose Chemical Company, 80 Clifford Street, Providence, R. I., serviced and sold exclusively by the Hanson-Van Winkle-Munning Company, which is located in Matawan, N. J.

An error crept into this description. The last sentence in the third paragraph read, "Highly polished pieces will take a dull black finish."

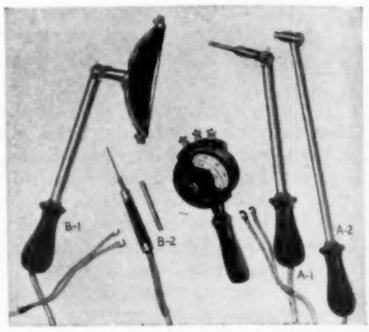
This sentence should have read, "Highly polished pieces will take a deep lustrous black finish, and dull surfaces will have a dull black finish."

Combination Pyrometer

The **Pyrometer Instrument Company**, 109 Lafayette St., New York, has placed on the market a new set of Combination Surface and Needle Pyrometers which is said to be unique and to find universal application in many industries like die casting, electrical, metallurgical, and many other industries.

By merely interchanging the various types of thermocouples, a matter of a few seconds, the instrument is said to transform into four different types of surface and needle pyrometer. The new indicator is equipped with Pyro patented clamping device whereby contact and reading of actual temperatures no longer have to be made simultaneously, —the indicating needle will stay fixed at the correct temperature indication.

Illustrated literature will be sent on request.



Combination Pyrometer

Synthetic Finish Unmarred By Drawing Operation

Sterilkote, a synthetic coating for metals, sufficiently adherent and elastic to permit bending, stamping and even drawing operations without cracking or marring of the finish, has been developed by the Bradley & Vrooman Co., 2629-35 South Dearborn Street, Chicago. Sterilkote may be had in a variety of attractive colors and clear, which develop into hard, glossy coats. Claims for it are said to be based on results of extensive tests over a long period.

Sterilkote is applied by spraying or roller coating and baked at a variety of temperatures and baking times according to the specific requirements.

It is recommended particularly for lining beverage and food containers, due to its being non-toxic, odorless, and tasteless, as well as non-porous.

While primarily designed as a liner, the new finish also is recommended for metal surfaces that are subjected to extremes in exposure and hard usage, such as washing machine lids, special types of dispensing cabinets, laboratory equipment and other fabricated units.

Foundry Supply House Uses Novel Sales Stimulation

The Superior Flake Graphite Company, 33 South Clark St., Chicago, makers of foundry facings, plumbago, core wash, parting and other foundry products, are employing a rather novel method of stimulating interest in Molduko, their core and mold wash. They have produced a very striking looking set of statuary bronze book-ends which are being offered with each introductory purchase of Molduko.

These book-ends are items both of beauty and utility and carry no advertising on their external surface so that they can be used to grace an office desk or the most expensive table in the recipient's library at home.

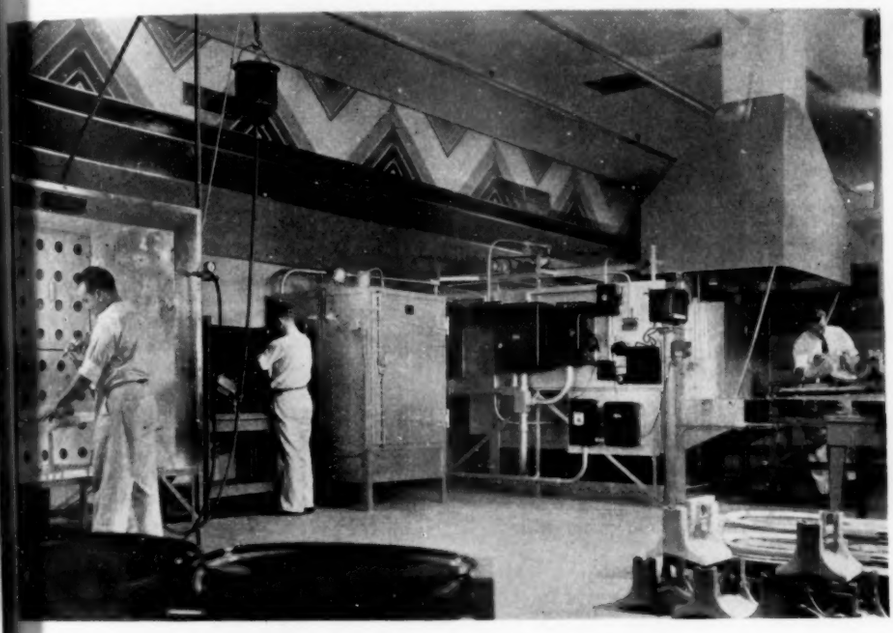
The castings, however, are cored; one core being made without dipping and the other Molduko dipped so as to give an actual and graphic illustration of the difference in results obtained with treated and untreated cores.

The whole job is being handled in a typical foundryman's way; the story of their product is very definitely told in these castings which, having served their purpose of showing the difference in core results, can become an article of utility in the foundryman's office or home.

Book-Ends Illustrate Use of Core Wash

Modern Porcelain Enamel Laboratory

Extensive laboratories with their interior walls finished in porcelain enamel have just been completed by the Chicago Vitreous Enamel Product Company, 1407 So. 55th Court, Cicero, Illinois, as an addition to their plant. Nearly 13,000 square feet of porcelain enamel were used in finishing the interior walls, furniture, light fixtures, columns, shower and toilet stalls and, in two of the rooms, the ceilings. Two new types of finishes, developed primarily for architectural purposes were used. These are known as "satin matt" and "velvet matt." The effect obtained resembles very closely the names given these enamels.



Spray Booth and Equipment, Dipping Tank, Dryer, and Large Laboratory Electric Furnace. Located in one Section of the Main Laboratory Room, This is one of the Three Miniature Enameling Plants

The main divisions of the laboratories are: main laboratory room, analytical chemical laboratory, office of the director of research, color and enamel control laboratory, physical instrument room, experimental smelting department, smelt record room and shower and locker room.

The main laboratory contains what is virtually three miniature enameling plants. One of these is devoted exclusively to testing frit smelts; another is used for accurate color matching, and one is used in connection with general enamel development, research and control. Physical tests not requiring a darkened room, such as cross-bending, impact, thermal shock and tests to determine the coefficient of expansion and general workability of enamels are also performed here.

A partial list of the equipment in the main laboratory follows: two large and two small electric enameling furnaces; hot plates; dryer; complete spraying equipment at three of the furnaces; sinks for washing out spray guns and other equipment when changing from one experimental enamel to another; dipping racks; special type milling equipment where twenty mills of porcelain enamel may be run simultaneously; four large experimental mills and miscellaneous equipment.

In the experimental smelting department, three experimental smelters with a capacity of from 50 to 75 pounds, and two larger smelters with 150 pound capacity are located. These have been constructed with modern control equipment, with each unit having individual blowers, burners, pyrometer and draft or stack controls. They are larger than the usual type of experimental smelter, for in the opinion of this company, the results obtained with smelters of the type it has installed present a more accurate indication as to the possibility of the enamel's being developed for commercial use.

B. T. Sweely is the director of research for this company.

New Testing Service

South Florida Test Service, P. O. Box 387, Miami, Florida, has instituted an interesting service for manufacturers who desire to save time in determining the durability and permanency of their products by actual exposure tests. Located as they are in one of the humid sections of the Atlantic seaboard, they are in a position to make actual exposure tests, both open air and under sea water immersion, and also special tests to duplicate the indoor use of products or materials with a high degree of accuracy. They also make merchandise researches on products or materials distributed in South Florida.

The advantage of having the work done in this section is that generally three to four months produces the same type of failure that would appear in one year under typical northern climatic conditions. Products that stand up under South Florida conditions are certain to be durable and are likely to make better records in other sections.

New Catalogs

"Shamva" Mullite; 3300° super refractory. The Mullite Refractories Company, Shelton, Conn.

Platinum; a synopsis of the industry. An interesting summary of platinum, covering history, qualities and uses, coinage, production, consumption, prices, etc. International Platinum Corporation, 42 Broadway, New York.

Cerromatrix. A material and a method for reducing the cost and time involved in die making. Cerro de Pasco Copper Corporation, 44 Wall Street, New York.

Approximate Relations Between Brinell, Rockwell and Shore Hardness Values and the Corresponding Tensile Strengths (helpful in correlating terms frequently used in connection with alloy steels). **Hardness Conversion Table for Constructional Alloy Steels. A Guide to the Selection of Nickel Alloy Steels. A Guide to the Selection of Nickel Cast Irons.** All available on request to engineers and metallurgists. International Nickel Company, 67 Wall Street, New York.

Air Hygiene Foundation of America. Information Circular No. 1, giving the purposes and regulations of this organization. Mellon Institute of Industrial Research, Pittsburgh, Pa.

Behavior of the Automobile Industry in Depression. By John W. Scoville, Chief Statistician, Chrysler Corporation, Detroit, Mich.

Rustproofing by the Cromodine Process. A comprehensive bulletin covering this method of rustproofing iron and steel products. American Chemical Paint Company, Ambler, Pa.

Quicker Drying at Low Cost. Centrifugal dryers, Mercil type. Bulletin CD-101. Hanson-Van Winkle-Munning Company, Matawan, N. J.

Plicote. A series of coatings for the protection of metal, wood or concrete against corrosion and deterioration from exposure to moisture, acids, alkalies, etc. The Watson-Standard Company, 225 Galveston Avenue, Pittsburgh, Pa.

Seamless Flexible Metal Tubing. Bulletin 1936-1. American Metal Hose Branch, American Brass Company, Waterbury, Conn.

Labor's Enemy No. 1. The 30-Hour Week. A graphic analysis by Allen W. Rucker and N. W. Pickering. Farrel-Birmingham Company, Inc., Ansonia, Conn.

"Alnor" Boyle System Velvometer. An instantaneous direct reading air velocity meter. Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago.

Pyro Surface Pyrometer. The Pyrometer Instrument Company, 109 Lafayette Street, New York.

Improved Surface and Needle Pyrometer. The Pyrometer Instrument Company, 109 Lafayette Street, N. Y.

Industrial Ovens and Dryers, for baking japan, enamel, lacquer, varnish and synthetic resin finishes, core baking, mold drying and metal heat treating to 1250 degrees F. Gehnrich Corporation, Skillman Avenue and 35th Street, Long Island City, N. Y.

Nickel Glo, for better barrel plating. An addition agent for producing bright nickel deposits. Lea Manufacturing Company, Waterbury, Conn.

How to Bronze Weld. A practical presentation of the fundamental theory and technique of bronze-welding and bronze-surfacing. Linde Air Products Company, 205 E. 42nd Street, N. Y.

Nickelsworth. An illustrated leaflet on the uses and advantages of Monel metal and rolled nickel. International Nickel Company, 67 Wall Street, N. Y.

Your New Plant—Multistory or Single Story—Which? The Austin Company, Cleveland, Ohio.

Show Schedule for 1936. A special supplement containing a complete listing of new trade, industrial and professional shows and expositions scheduled from March to December, 1936. Price $2.00 per copy. Exhibitors Advisory Council, Inc., 330 W. 42nd Street, New York.

Operating Costs of Light Duty Trucks. A report recently issued by the Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York.

Hand-Crafted Cast Bronze Tablets, Markers, Plaques, Signs. Newman Brothers, Inc., 660-70 W. 4th Street, Cincinnati, Ohio.

Associations and Societies

American Electro-Platers' Society

Care of E. Steen Thompson, 905 W. 10th Street, Erie, Pa.

Arrangements are moving forward at top speed for the coming convention in Cleveland, June 1-4. The program is being rounded out and the exhibit space is moving briskly. On March 14th, 52 booths had been contracted for.

In our March issue on page 113 we published a list of firms who had arranged for space. Below are the names of additional firms who have taken contracts since that time:

Anderson and Sons, Springfield, Mass.
Columbia Electric Mfg. Company, 4519 Hamilton Avenue, Cleveland, Ohio.
Electric Products Co., Cleveland, Ohio.
Globe Machine & Stamping Co., Cleveland, Ohio.
Kelly Plating Company, 10316 Madison Avenue, Cleveland, Ohio.
Matchless Metal Polish Company, Glen Ridge, N. J.
McGean Chemical Company, Keith Building, Cleveland, Ohio.
Metal Industry, New York.
Nickel and Chromium Products Corporation, 250 Park Avenue, New York.
Platers' Guide, New York.
Puro Products Company, 2602 Payne Avenue, Cleveland, Ohio.
Standard Electrical Tool Company, Evans and 8th Streets, Cincinnati.

The headquarters of the convention will be the Carter Hotel and it is advisable for all those who intend to stay at this hotel to make their reservations early as it is expected that there will be a record breaking attendance. All exhibits and meetings will be held in the hotel.

Arrangements will undoubtedly be made for reduced fare railroad certificates and information on this subject will be published at an early date.

Bridgeport Branch, A. E. S.

Care of Charles H. Costello, 1285 Boulevard, New Haven, Conn.

The annual technical session and banquet of the Bridgeport Branch of the American Electro-Platers' Society was held on March 14 at the Hotel Stratfield, Bridgeport, Conn. The technical session which opened at 2 P. M. was presided over by Walter R. Meyer. The following papers were read:

The Protective Coatings for Metals. George B. Hogaboom.

Applications of Mesle's Chord Method for Measuring Thicknesses of Metallic Coatings. Dr. William Blum.

Exploration in the Field of Electroplating. Dr. Raymond R. Rogers.

Pictorial Studies of Plating Solutions. William M. Phillips.

The meeting was attended by over 150 men and the discussions active, showing the deep interest of the audience in these subjects.

The banquet was attended by over 200 people, and was, as expected, a most enjoyable affair.

Newark Branch, A. E. S.

c/o George Wagner, 1134 S. Long Ave., Hillside, N. J.

Newark Branch of the American Electro-Platers' Society will hold its Annual Banquet and Education Session at the Hotel Douglas, 20 Hill Street, Newark, N. J., Saturday, April 18, 1936.

The educational program arranged by **Nelson Sievering** will be very interesting. The speakers will be as follows: **George B. Hogaboom, Dr. C. B. F. Young, Oliver J. Sizelove, Austin Fletcher.**

The banquet committee has arranged for an evening of entertainment with free Bingo games for prizes and dancing to the tune of a high-class orchestra. The price for banquet tickets is $2.75 each, including Federal Tax.

The committee will be as follows: **Horace Smith,** Chairman; **George Wagner,** Program; **Nelson Sievering,** Educational; **Jack Holland,** Publicity; **Oliver J. Sizelove, William Torrence, George Reuter, Tom Haddow,** Entertainment; **Nelson Sievering, John Kotches, George Klink,** Tickets.

Midwest Electroplaters

7320 Hamilton Avenue, Detroit, Mich.

The Master Electro-Platers' Association of the Midwest held its quarterly conference on March 28 and 29 in Toledo, Ohio, at the Hotel Secor, with the following program:

Saturday, March 28, 1936

9:00 a.m.-10:30 a.m.—
Registration for Instruction on use of (1) Bausch Lomb Microscope; (2) Control Equipment; (3) Consultant service with technical committee re. any information desired.

10:30 a.m.-12:00 a.m.—
First Business Session. Introductions. Greetings by Toledo Association. Statement of Purpose by President Bell, Secretary's Report, Treas. Report, Unfinished Business—A Plan for Accrediting Shops.

12:00 a.m.-1:30 p.m.—
Second Business Session. Paper by **Henderson Bell**—The Importance of thorough Diagnosis and Cure for Our Costing Problems; Discussion of Efforts Made Since December meeting; Business Items; Paper by **M. B. Hammond,** Chemist, Michigan Bumper Corp., Grand Rapids, Mich. on How We Plate with Bright Nickel on Bumpers and Why.

3:30 p.m.-6:00 p.m.—Recreation.

6:00 p.m.-7:30 p.m.—Dinner.

7:30 p.m.-9:30 p.m.—
Third Business Session. Items of Business. Moving Pictures Regarding Construction of Diesel Engine for Power, Heat and Lighting Plant—What the Diesel Engine Will Do for Operating Costs—by **C. E. Dietle,** Engineer, Fairbanks Morse & Co.

10:00 p.m.—
Social Hour. Including entertainment, debate, etc. Dancing and tables reserved for couples at Saturday Night Club. Silver Ball Room.

Sunday, March 29th

8:30 a.m.-9:15 a.m.—
Breakfast.
9:30 a.m.-12 a.m.—
Fourth Business Session. Business Items. Symposium of Economy—Over 30 brief 2-minute statements covering over 30 items of economy adopted in member plants during past year given by more than 30 shop owners.
12:00 noon—
Inspection of Toledo Plants.

Program for Ladies

A special program was arranged for the ladies including luncheons, bridge, teas, dinners, a theatre party and social hours.

Displays

1. **The Bausch Lomb Microscope** and how to use it. Including personal demonstration by appointment at Registration Desk, 2nd floor, beginning 10.00 a.m., under supervision of Jas. E. Nagle & Sons, Inc.
2. **Control Equipment for Small Shops,** including personal conferences by appointment as explained above, under supervision of Hilfinger Sons Co.
3. **Technical Committee**—Personal conferences respecting any information you may be seeking by appointment as explained above, under direction of Gerity-Whitaker Co., Inc.
4. **Other Items of Interest.**

Waste Material Dealers

Times Building, New York

The annual convention of the National Association of Waste Material Dealers was held at the Hotel Astor on March 16-18.

Among the interesting papers which were presented were the following:

Can a Trade Association Be Expected to Solve Problems or Change Conditions Which Are Economic in Origin? by Edward B. Friedlander, President, N.A.W.M.D.

How Waste Material Dealers Might Strengthen Their Buying Connections With Industrial Concerns by R. W. Phillips, Manager, Salvage and Reclamation Division, E. I. du Pont de Nemours & Company, Inc.

Are We Progressing? by Egmont L. Frankel, Managing Director, Frankel Bros., Ltd.

Secondary Metal Institute Program

The Secondary Metal Trade indicated widespread interest in the address which was made at the meeting of the **Secondary Metal Institute** on Tuesday afternoon, March 17th, by **Elmer W. Pehrson,** Supervising Engineer, Non-ferrous Section, Metals and Non-Metals Division of the U. S. Bureau of Mines. Mr. Pehrson has made some of the most important investigations which have been prepared by the Bureau of Mines covering secondary metals.

The Secondary Metal Institute meeting will immediately follow the Open House Luncheon sponsored by the N.A.W.M.D. New York Metropolitan Luncheon Club.

Louis Schwab presented for the **Philadelphia Metals Association,** a memorandum that copper refiners were purchasing scrap from small dealers at prices equal to those offered large dealers and from producers at prices equal to and above those offered the large dealers. The meeting empowered the selection of a committee to take the matter up with the copper refiners.

The officers and directorate of the Institute were re-elected for two years. **Harry S. Goldstein,** of **L. Goldstein's Sons, Philadelphia,** is president; **Louis Lippa,** of **Apex Smelting Company,** Chicago, vice-president; **Charles M. Haskins,** secretary-treasurer.

Mr. Lippa delivered a paper calling for better grading of scrap by dealers, now that business is improving, and for a uniform rejection policy by consumers regardless of the changing supply of material.

At the Association's general meeting on Wednesday, **E. B. Friedlander,** of Chicago, was re-elected president.

The annual banquet was held on Wednesday, March 18 at which the attendance was larger than ever before in the history of the Association.

Electrochemical Society

Columbia University, New York

At the coming Cincinnati meeting which will be held at the Hotel Netherland Plaza, April 23, 24 and 25, 1936, one session will be devoted to the discharge of electricity through gases, and another to inhibitors. In addition a session will be held on organic electrochemistry, electrodeposition and batteries. The session on inhibitors is scheduled for Thursday morning at the Hotel Netherland Plaza, the headquarters of the meeting. **Prof. J. C. Warner** of the **Carnegie Institute of Technology** will preside. Emphasis will be laid upon the inhibitors used in electrochemical processes. There will be at least six contributions and probably more on this very important subject.

The Friday morning session will be in charge of **Dr. R. L. Seabury** of the **Delco Remy Division** of **General Motors Corporation.** Papers will be read on electrodeposition, on organic, electrochemistry and batteries. The Friday luncheon is tendered by the Schenley Distillery Company at its plant at Lawrenceburg, Ind. On Friday evening will be held the annual dinner dance in the Hall of Mirrors of the Hotel Netherland Plaza. Immediately after the dinner, **James H. Critchett** will present his presidential address. Then will follow the award of honors and prizes, and finally the informal dance.

Papers on electrometallurgy and plating include the following:

Electrodeposition of Manganese from Aqueous Solutions, Part 1. Chloride Electrolytes. H. H. Oaks and W. E. Bradt.

Effect of Certain Impurities in the Forming Acid on Plate Forming Time. J. E. Hatfield and H. R. Harner.

Simultaneous Electrodeposition of Thallium and Zinc. W. G. Parks and I. M. LeBaron.

Use of Inhibitors (With Special Reference to Antimony) in the Selective Removal of Metallic Coatings and Rust. S. G. Clarke.

Beryllium Copper Used in Electrical Switch Springs. A. L. Riche.

Foundry Equipment Manufacturers

1213 W. 3rd Street, Cleveland, O.

R. S. Hammond, vice-president, Whiting Corporation, Harvey, Ill., has been elected president of the Foundry Equipment Manufacturers Association, Inc.

Other officers chosen were **B. C. Trueblood,** Arcade Manufacturing Company, Freeport, Ill., vice-president; and **Arthur J. Tuscany,** executive secretary. New Directors elected to fill expired terms on the board are **E. O. Beardsley,** Beardsley & Piper Company, Chicago, Ill.; **R. W. Hisey,** Osborn Manufacturing Company, Cleveland, Ohio and **Thomas Kaveny Jr.,** Herman Pneumatic Machine Company, Pittsburgh, Pa.

Plans were made at the annual meeting for a display of foundry equipment at Convention Hall, Detroit, Mich., May 4 to 9.

New Jersey Foundrymen

c/o John L. Carter, 83 Polk St., Newark, N. J.

The March Dinner Meeting of the New Jersey Foundrymen's Association was held on Wednesday, March 11, at 6:30 P. M. at the Downtown Club, National Newark and Essex Building, 744 Broad St., Newark.

The subject was **"The Social Security Act,"** and they were very fortunate in securing a speaker—**Thomas E. Shearer**—who is exceptionally well qualified to talk on this subject. **Mr. Shearer** is Editor of the Prentice-Hall Labor and Unemployment Insurance Service, and is therefore not only thoroughly familiar with all the complex provisions of the Federal Act, but is also well informed about the various State Laws which have been passed in a number of States to conform to it. He pointed out some of the practical difficulties which are being encountered in some States, due to defects in State Laws which should be avoided. He also explained the "Merit System," which has been adopted in some States, by which some employers may be able to reduce their Unemployment Insurance Tax from 3% to as low as 1%.

Arthur M. Torrey, Secretary, Employers' Association of North Jersey, was also present and told about the present status of State Social Security Legislation in New Jersey.

American Zinc Institute

60 E. 42nd Street, New York

The 18th annual meeting of the American Zinc Institute will be held at Hotel Statler, St. Louis, Mo., April 20 and 21.

Among the subjects to be considered are: legislation affecting the zinc industry, a study of silicosis and technical discussions on galvanizing practice and problems.

Power Show and Conference

c/o G. E. Pfisterer, 308 W. Washington St., Chicago, Ill.

The educational phase of the power industry will be heavily emphasized at the Midwest Engineering & Power Exposition and the Power Engineering Conference, April 20-24 in Chicago, according to plans being developed.

Many of the 250 companies showing at the exposition are building concrete examples of equipment and educational phases of their lines. The exposition will be held in the International Amphitheatre.

All major activities of the conference program are virtually complete. There will be 12 sessions with approximately 35 papers by leading engineers, each a recognized authority in his field. The program has been organized with the cooperation of the various participating engineering societies.

Morning sessions of the conference will be held in the Palmer House and the afternoon meetings will be in the Amphitheatre. Special transportation has been arranged.

Oil Burner Institute, Inc.

30 Rockefeller Plaza, New York

The 12th annual Oil Burner Show will be held in Detroit, April 14-18. Exhibits will feature oil burner and air conditioning equipment and installations. A record number of exhibits is already assured, and the attendance is expected to be the highest in the history of the industry.

Battery Manufacturers

7 E. 44th Street, New York

The National Battery Manufacturers Association will hold their Spring Convention at the Statler Hotel, Cleveland, Ohio, May 20 and 21.

Personals

Wallace G. Imhoff

At the recent meeting of the Board of Directors of the American Hot-Dip Galvanizers Association, 903 American Bank Building, Pittsburgh, Pa., Wallace G. Imhoff, President of the Wallace G. Imhoff Co., Vineland, N. J., was ap-

WALLACE IMHOFF

pointed Technical Director of Research for the Association.

Mr. Imhoff is the author of a number of articles that have appeared in **Metal Industry,** has written many technical articles that have been published in all the trade journals on hot-dip galvanizing and hot-dip tinning, and is the author of the book, "Pickling of Iron and Steel." He was the Technical Director of Research for the Metal Ware Association of New York and Buffalo from 1920 to 1925, being a Fellow of the Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa. He has the degrees of B.A., B.S., M.S., and E. Met. His galvanizing experience started in the wire department of the American Steel & Wire Company, Rankin, Pa. For a number of years he was engaged in the practical operating end of the steel industry making pig iron and steel on war orders for the Allies during the World War. For the past fifteen years his time has been devoted entirely to the hot-dip galvanizing and hot-dip tinning industries.

L. D. Holland, formerly sales manager of the Western division of **E. F. Houghton and Company,** Philadelphia, Pa., has been made manager of research development with headquarters in Philadelphia. **A. A. Miller,** formerly head of the Cincinnati office, has been promoted to the position of Western sales manager, with office in San Francisco.

George P. Halliwell, formerly assistant professor of non-ferrous metallurgy at the **Carnegie Institute of Technology,** Pittsburgh, Pa., has joined the staff of **H. Kramer and Company,** Chicago, Ill., manufacturers of brass and bronze ingots. **Mr. Halliwell's** work will be in connection with a newly expanded research program instituted by the company. New testing and other laboratory equipment has been installed and extensive additions are to be made in the chemical and physical laboratories.

Harold W. Faint has recently joined the sales organization of **Divine Brothers Company,** Utica, N. Y., and will be located in the Metropolitan New York district handling Divine polishing wheels, buffing wheels, and other products. **Mr. Faint** is a graduate of Rutgers University in chemical engineering. In addition he has had a number of years of practical experience in chemical work, analysis of plating solutions, application of metal cleaners, and experience in the sale of buffing wheels.

Maas & Waldstein Elections

On March 11, 1936, the Board of Directors of Maas & Waldstein Company, Inc., Newark, New Jersey, manufacturers of lacquers and lacquer enamels re-elected as President, **M. A. Maas,** who has held that position for 11 years. **Gustave Klinkenstein** was elected Vice-President and General Manager, **R. F. Magnus** was elected Treasurer, and **B. D. Sanderson** was reappointed Sales Manager.

Mr. Klinkenstein, who now assumes the general management of the company, has been associated with it for

GUSTAVE KLINKENSTEIN

over twenty years. He began work as a chemist, and later became Chief Chemist, and recently Director of Research. He is thoroughly familiar with all phases of his company's work and is well known in the finishing field.

Mr. Magnus has been with the company for eight years. He is the son of the late **Frederick S. Magnus,** who was Treasurer of **Maas & Waldstein** since 1914. He is fully conservant with the duties of his new office as he worked in close cooperation with his father for many years.

International Nickel Executive Changes

Robert C. Stanley, president of **The International Nickel Company of Canada, Limited,** 67 Wall Street, New York, announced that four members of the executive staff had been elected to new positions. **Dr. John F. Thompson,** for the last five years the sole vice-president of the company, has been made

executive vice-president, and **Dr. Paul D. Merica,** formerly assistant to the president, **Donald MacAskill,** general manager in charge of Canadian operations, and **D. Owen Evans,** delegate director of The **Mond Nickel Company, Limited,** have been elected vice-presidents.

F. J. Walls, a member of the Development and Research Division of the International Nickel Company, Inc., 67 Wall Street, New York, spoke before the Milwaukee Chapter of the American Foundrymen's Association at their regular monthly meeting on March 13th. Mr. Walls, who is a past president of the Detroit Foundrymen's Association, described some of the important achievements in which nickel and associate alloys have contributed to the advancement of the foundry industry and the improvement of its products. The talk was illustrated with slides.

Obituaries

Joseph A. Straub

Joseph A. Straub of 309 Mosholu Parkway, New York City, widely known electroplater and metal finisher of the Metropolitan District, died of intestinal influenza on Saturday, February 8, 1936, at a New York City hospital. He was seventy-one years of age.

JOSEPH A. STRAUB

Mr. Straub started his career as an electroplater over fifty (50) years ago with Roger Brothers, silverware manufacturers, where he learned the rudiments of his profession, remaining with this firm for some years. He subsequently established and conducted his own plating business at No. 17 Maiden Lane, New York City. In 1904 he was engaged by the R. H. Macy, Inc., New York's famous retail establishment, to install and supervise an electroplating department, marking an epoch in retail store progress. He remained with Macy's actively as supervisor of this department until the time of his death. He was a member of the Twenty-Five Year Club of his company. He was long a member of the New York Branch of the American Electro-Platers' Society and until recent years was a familiar figure at the annual conventions held throughout the country by the National organization.

Mr. Straub is survived by his widow, Mrs. Josephine Straub, two sons and two daughters.

Albert Willerth

Albert Willerth, a retired metallurgist, died recently in his home, 145-19-221st Street, Laurelton, Queens, New York. He was formerly owner of the Jefferson Brass Foundry of Brooklyn, and devoted many years to the study of pure metals, alloys and precision in foundry methods.

Joseph Stauffer

Joseph Stauffer, died on February 18 at the age of 82. Mr. Stauffer was a pioneer metal manufacturer and vice-president of the Galt Art Metal Company, Galt, Ont., Canada.

Ralph G. Wright

Ralph G. Wright, one of the owners of the Reed Manufacturing Company, Erie, Pa., manufacturers of plumbing supplies and equipment, died recently.

Samuel Schwartz

Samuel Schwartz, president, Schwartz Manufacturing Company, Two Rivers, Wis., buffing and polishing wheel manufacturers, died in Miami, Fla., at the age of 70.

Alfred K. Potter

It is with deep regret that the manufacturing jewelry industry notes the untimely passing on February 19, 1936 of Alfred K. Potter, Acting President and Director of The Jewelers Board of Trade, Turks Head Building, Providence, R. I. He was associated with the Board in the capacity of a Director for over thirty years and during recent months has been Acting President.

Throughout his life Mr. Potter was a leader in whatever field of endeavor his interests lay, and his civic and industrial connections brought him recognition from many quarters.

Alexander H. Boyd

As we go to press word comes of the death of Alexander H. Boyd, New York manager of Hanson-Van Winkle-Munning Co., Matawan, N. J.

A more extended biography will be published in our next issue.

Frederick T. Barry

Frederick T. Barry, jewelry manufacturer died suddenly of a heart attack at his home in Greene Manor, Germantown, Pa., recently, at the age of 64. Mr. Barry was the son of the late James W. Barry, whose family has been in the jewelry business in Philadelphia for some 70 years. He was a member of the Jewelers' Club and other organizations. His widow, Bessie Allen Barry; a son, F. Allen Barry; a daughter, Mrs. Edward Matlack and a brother, Harry C. Barry, survive.

Julius Wolfson

Julius Wolfson, aged 49, president-secretary-manager of the Durable Metal Products Corporation, 85-Spring Street, South Norwalk, Conn., died recently at his home, Sunset Hills.

Mr. Wolfson came to South Norwalk two years ago from New York as head of the metal products company, which formerly operated in that city. He was an officer also of the Maxine Cosmetics Company.

Survivors are his wife, Mrs. Fanny Wolfson, two sons, Paul and Morris, two daughters, Ruth and Sylvia, and a sister, Mrs. May Ridenstreif of New York.

Mr. Wolfson was a member of the Workman's Circle.

E. H. Frohman

E. H. Frohman, vice-president, S. Obermayer Company, Pittsburgh, Pa., died recently on the steamer Franconia while on a world cruise. Mr. Frohman was prominent in the work of the Pittsburgh Foundrymen's Association, and was well known in the foundry industry throughout the country.

Metal Developments

Copper Roofs last for ages! The copper roof on historic Trinity Church of New York is one of the striking examples of the rust proof and enduring qualities of this metal. The church was completed and dedicated in 1846, but still carries the same copper roof, which, according to the Sexton of the church, has not cost ten cents for upkeep and repairs. Another instance is the copper roof of Christ Church, Philadelphia, which has been in service for almost 200 years and is still good. Perhaps the oldest copper roof in the world is that on the Cathedral at Hildesheim, Germany. The roof was laid in 1367, and according to information from the Copper and Brass Research Association, it is still in a good state of preservation, and has required little upkeep.

An interesting piece of news from England which may reflect the tendencies in the electroplating industry, is the fact that the **Hercules Cycle and Motor Company** have recently put into service in their plant in Birmingham, the largest electroplating rectifier equipment in the world. The power for nickel and chromium plating and for electro-cleaners is provided by six Westinghouse metal rectifiers with capacities varying from 5 volts to 7 volts and 2500 amperes to 12,000 amperes. The company claims that high efficiency is maintained down to even very low loads and that a power factor of the order of 0.9 is obtained.

Electric furnace brazing has been designated as the method of providing strong gas-tight joints in long range projectiles for use with tear gas by the Lake Erie Chemical Company. The brazing is done in a General Electric 20 kw. batch-type electric furnace operated at 2100 deg. F., and used in conjunction with a General Electric combustion type furnace atmosphere controller.

A **design laboratory** has been set up by the **Federal Art Project** of the U. S. Works Progress Administration at 10 East 39th Street, New York, with Gilbert Rohde as director. It is a free school for instruction in industrial design, open only to those amateur and professional students who cannot afford to attend private art schools.

The production of **aluminum collapsible tubes** in Germany has expanded until at this time it covers 12 per cent of the total output of this product, according to information received by the **Metals and Minerals Division** of the U. S. Department of Commerce.

Production of **white base anti-friction bearing metals** by 39 manufacturers reporting to the **U. S. Bureau of the Census** amounted to 2,510,461 pounds compared with 1,954,084 pounds in December and 1,923,826 pounds in January, 1935. Production in 1935 totalled 22,963,751 pounds against 21,389,527 pounds in 1934.

An interesting application of metal spraying was exhibited at a recent Commercial Motor Show in England by **Barimar Ltd.** of London, England. A number of aluminum pistons were built up to replace worn spots by spraying with cast iron. It is claimed that these repaired pistons are made adequate for service at a cost of much less than that of new pistons.

D. K. Crampton, director of research, **Chase Brass and Copper Company,** stated in a recent issue of Mining and Metallurgy, that several copper alloys used heretofore only in sand castings are now available in wrought form. These alloys include nickel-aluminum bronzes and 88 copper, 4 tin, 4 zinc, 4 lead.

Chromium is now being applied to the surface of steel objects by a process similar in principle to calorizing and sherardizing, namely, packing the work in chromium powder (with the addition of special products) and heating for several hours at temperatures above 1850 degrees F. It is believed that on a large scale the cost of "chromizing" will be in the neighborhood of 5 cents per pound. The surface is slightly rough and dull, but it is stated, can be buffed to a high polish.

The history and usefulness of nickel as an alloying element were outlined in a lecture sponsored by the New Jersey Chapter of the American Society for Metals at Newark College of Engineering, Newark, N. J., March 20, by **N. B. Pilling,** Manager of the Bayonne Laboratory of The International Nickel Company, Inc.

The **American Die Casting Institute** is holding a large exhibit of die castings and die cast products at **Metal Products Exhibits, Inc.,** International Building, Rockefeller Center, New York. The exhibit consists of enlarged production photographs and many new products which have been designed for die castings. These products will be assembled and in many cases the complete production story will be made clear from the exhibits. Twenty-seven commercial die casters are co-operating.

What has been described as the best flute in the world is one used by **George Barrere,** world famous flutist. The instrument is made of solid platinum at a cost of about $3,000.

Unlimited supplies of magnesium recovered from the ocean will develop many industrial fields in the opinion of **Henry Chesney** of **Marine Chemicals Company, Ltd.,** in a report to the American Chemical Society, describing the successful production of minerals from sea water at South San Francisco, Calif.

Lowenstein Plant Reorganized

The **United-Carr Fastener Corporation**—Lowenstein Division—83 Roebling Street, Brooklyn, N. Y., were recently visited by a representative of this Publication, who was greatly impressed, and learned that during the latter part of December, 1935, the policies of the management had been changed. The reorganization is functioning smoothly and much better results are being obtained. Plant and office layout were revised. The well placed machinery painted with aluminum paint is noticeable and all work in process is in an orderly arrangement.

The personnel seem to be a group of efficient, interested employees who are keyed to action coupled with a keen desire to produce quality as well as quantity. Noticeable in various parts of office and factory are small signs "Quality is not accidental."

Semi-automatic and automatic machinery is superseding some of the hand operations. The most outstanding are the soldering, lacquering, plating and punch press operations. Production is controlled by a chart in the center of the factory. A Customers Promise Schedule, also on a chart, is in the office. The Purchase Control chart, shows quickly and clearly the status of all purchases and the promised delivery date.

The plant maintains a Part Stock Department in which many hundred different parts are kept; the arrangements of bins, drawers and shelves show sound practical planning. A perpetual stock record shows the location and quantity on hand and a simple system of location control is also maintained.

Corporation Earnings

Net Profit Unless Followed by (L) Which Is Loss

	1935	1934
Aluminum, Ltd.	210,000	100,467
Aluminum Goods Manufacturing Company	$924,126	$551,165
Aluminum Industries, Inc.	72,675	69,661
American Metal Company	801,527	232,485 (L)
American Smelting and Refining Company	13,768,153.14	7,583,202.29
Anaconda Wire & Cable Company	2,942,125	2,535,183
Art Metal Construction Company	259,147	71,970 (L)
Bridgeport Brass Company	726,617	576,636
Canada Wire and Cable Company	195,064	6,636
Colt's Patent Fire Arms Mfg. Co.	562,285	577,824
Crane Company	1,442,637	1,021,543
Doehler Die Casting Company	623,818	460,550
Driver-Harris Company	245,496	138,806
Eagle-Picher Lead Company	583,620	153,192 (L)
Elgin National Watch Company	1,071,655	736,358
General Electric Company	27,843,772	19,726,044
International Nickel Company	26,086,527	22,235,997
International Silver Company	496,687 (L)	206,183
Landers, Frary & Clark	584,029	514,165
Manning, Bowman and Company	21,500	652
National Enameling & Stamping Company	312,895	372,591
Oneida, Ltd.	640,718	334,288
Pyrene Manufacturing Company	133,593	91,925
Remington Arms Company	136,525	142,589
Revere Copper and Brass, Inc.	425,555	1,011,101
Reynolds Metal Company	1,419,267	1,642,460
Scovill Mfg. Company	1,057,285	730,576
United-Carr Fastener Corporation	729,973	498,088
Vulcan Detinning Company	311,318	262,113
Western Electric Company, Inc.	2,620,279	7,751,548 (L)
Westinghouse Electric & Mfg. Company	11,983,380	189,562
Yale & Towne Mfg. Company	477,665	59,889

Business Items-Verified

Fisher **Furnace Company,** 1822-36 N. Lamon Avenue, Chicago, Ill., has changed its corporate name to **Fisher Furnace Company, Inc.**

New Haven Clock Company, Waterbury, Conn., held its annual stockholders' meeting recently. Directors chosen included **Henry F. English, Edwin P. Root, James E. Wheeler, Richard H. Whitehead, Edward Stevens, Philip H. English, Edward G. King** and **Harry O. Latham.** The directors' election resulted in the re-election of **Richard H. Whitehead,** president; **Edward Stevens,** vice-president; **Willard E. Chamberlain,** vice-president; **Philip H. English,** secretary-treasurer; **Fred L. Bradley,** assistant secretary; **Frederick A. Neumann,** assistant treasurer, and **William A. Morgan,** assistant treasurer.

Rochester Brass Corporation, Rochester, New Hampshire, make all types of non-ferrous castings, assemblies and sub-assemblies; fully equipped machine shop. The firm solicits tonnage.

George Birkenstein announces the organization of his own company under the style of **George Birkenstein Corporation,** with offices in the McCormick Building, 332 South Michigan Avenue, Chicago. The new company will engage in a general brokerage business in metals, with important smelter and warehouse connections, handling all grades of scrap and the ingot metals with which Mr. Birkenstein has been identified for many years. Upon graduation from the University of Michigan, Mr. Birkenstein, 17 years ago, joined the firm founded by his grandfather, becoming president and chief executive officer a few years ago. He has been prominently identified with the secondary material industry, serving for three years as president of the National Association of Waste Material Dealers and as chairman of the Code Authority of the Non-Ferrous Scrap Metal Trade under the NRA. In 1933 he served as secretary of the Chicago section of the American Institute of Mining and Metallurgical Engineers.

U. S. Stoneware Company, manufacturers of corrosion-proof chemical equipment, after having been at 50 Church Street, New York City, for the past fifteen years, moved their general sales offices on March 27th to larger quarters in the Lincoln Building, 60 East 42nd Street, New York.

St. John X-Ray Service, Inc., 30-20 Thomson Avenue, Long Island City, N. Y., announce that they will conduct two practical training courses in Metal Radiography at their laboratory this summer. One will be held for those attending the A.S.T.M. meetings during the week of July 6, and the other one during the week of July 13. Further information will be given upon request.

Henry Nelkin, Inc., 128 Mott Street, New York City, incorporated in 1912, are expanding, taking new quarters in the same building and almost tripling their former floor space. All branches have been enlarged and new branches have been installed, such as sand-blasting and gas-heated baking ovens, for japanning and enameling at temperatures up to 500° F. They are associate members of the Real Estate Board of New York and members of the Masters' Electro-Plating Association.

Empire Metal Creations, Inc., 21 East 21st Street, New York, manufacturer of metal products and novelties, have leased floor in building at 4 West 16th Street, for plant. This firm operates the following departments: casting shop, soldering, plating, polishing and lacquering.

Feick Manufacturing Company, Cleveland, Ohio, recently organized to manufacture sheet metal products, including advertising novelties, has leased about 10,000 sq. ft. in building at 10225 Meech Avenue, S. E., for plant. **Harry W. Feick,** formerly identified with **Par-Brook Manufacturing Company,** is head. This firm operates the following departments: stamping, and japanning.

Di Salle Plating Company, Toledo, Ohio, has been incorporated with a capital of 250 shares no par common stock to establish and operate a metal plating business. Principals of the new concern are **L. Di Salle, Assunda Di Salle** and **Anthony Di Salle. Michael Di Salle,** 1028 Edison Building, represents the firm. The following departments are operated: plating, polishing and grinding room.

Model Brass Company, Inc., Decatur, Ill., has purchased the **Model Brass Foundry,** making a general line of non-ferrous castings. President, **Clifford V. McKelvey;** Vice-President, **H. O. Potter;** Secretary-Treasurer, **Ted Fleming.** This firm operates the following departments: bronze, brass and aluminum foundry; casting shop.

Newman Bros., Inc., Cincinnati, Ohio, recently moved into a large new plant at 666 West Fourth Street. Successors to **Newman Manufacturing Company,** the firm specializes in architectural metal work and other types of castings. New foundry equipment with five crucible furnaces for non-ferrous metals has been installed in the new plant. The company has 106 employees, and is in the market for several direct current motors, 220 volts, 2 H.P., 5 H.P., 10 H.P., and snap flasks. The following departments are operated: brass, bronze and aluminum foundry, brass machine shop, tool room, casting shop, cutting-up shop, spinning, stamping, soldering, brazing, plating, polishing, grinding room, lacquering and japanning.

International Selling Corporation which recently moved to new quarters at 26-28 Beaver Street, New York, reports a large increase in its business, particularly in trichlorthylene, a non-inflammable solvent widely used in the degreasing of metals.

The **Lincoln Electric Company,** Cleveland, Ohio, announces the moving of its Pittsburgh office, formerly at 323 Fourth Ave., to larger quarters at 926 Manchester Blvd.

Pratt Industries Inc., have taken over the entire business of the **Pratt Chuck Company** of Frankfort, N. Y., and will operate from the same offices and plant. **Winthrop T. Scarritt** is President and Treasurer of the new organization; **George Sicard,** Vice President and Director of Sales; **Alexander Prinie,** Secretary.

The **M. P. Iding Disc Grinding Compound Company** announces its intention to incorporate within the next few days, with **M. P. Iding** as President. They also announce the removal of their main office and factory to larger quarters at 3534 W. Pierce Street, Milwaukee, Wis., about April 1st.

The **International Nickel Company, Inc.,** 67 Wall Street, New York, has announced the establishment of field representatives at Chicago and Los Angeles. In the Chicago area, inquiries should be directed to **H. L. Geiger,** Room 1116, 333 North Michigan Ave. Bldg., Chicago, Ill. On the West Coast, inquiries should be directed to **A. G. Zima,** 705 Petroleum Securities Bldg., Olympic & Flower Sts., Los Angeles.

Information is wanted of **Louis Pesacov,** about 51 years of age, native of Russia whence he arrived here in 1904; is of medium height, weighs 160 pounds, has blonde hair (bald), hazel eyes, smooth shaven; was in the metal business in Brooklyn, N. Y. This man has not supported his wife Bella, and their two children, William and Evelyn, since 1934 when he was separated from his family. Anyone knowing this man's whereabouts is requested to communicate with the **National Desertion Bureau,** 67 West 47th Street, New York.

The **Porcelain Enamel and Manufacturing Company** of Baltimore, Maryland has recently appointed **Harry Ingersoll** to be their Pacific Coast Representative. Mr. Ingersoll is located at 4514 S. Van Ness Avenue, Los Angeles, California. Before coming to Pemco, Mr. Ingersoll was employed by one of the largest stove manufacturers in the East, acting in the capacity of superintendent of their enameling plant.

The New York office and warehouse of the **Zapon Division, Atlas Powder Company,** will be moved to 333 Hudson Street, New York, N. Y.

The **Wrought Washer Manufacturing Company** of Milwaukee, Wisconsin, announces the introduction of a complete line of non-ferrous expansion plugs covering the range of metals in demand today, including brass, copper, aluminum, stainless steel, monel metal, etc.

The annual stockholders' meeting of **Farrel-Birmingham Company, Inc.,** was held at the main office of the company at Ansonia, Conn., February 20, 1936. Following the stockholders' meeting the Board of Directors met and re-elected

the following officers: **Franklin Farrel, Jr.**, Chairman, Board of Directors; **Nelson W. Pickering**, President; **Carl Hitchcock**, Vice President; **Franklin R. Hoadley**, Vice President; **Armin G. Kessler**, Vice President; **Frederick M. Drew, Jr.**, Treasurer; **Laurie K. Blackman**, Assistant Treasurer; **George C. Byrant**, Secretary; **William B. Marvin**, Assistant Secretary.

H. D. Farris, since 1922 active in the promotion and sales of cereal binders, has been appointed eastern sales representative of the **Great Lakes Foundry Sand Compound**, Detroit, Mich., miners and shippers of materials in carload lots to the foundry and steel trade.

Advance Aluminum Casting Corporation, 2742 W. 36th Place, Chicago, Ill., will be an exhibitor at the Texas Centennial Exposition, which opens in Dallas, Texas, on June 6 to November 29.

The **Barnsdall Tripoli Corporation**, Seneca, Mo., have started production on a new American pumice which is said to be equal in every respect to Italian pumice. An experimental washing and sizing plant has been built at the deposit near Grants, N. M., and is now in operation. An experimental grinding and sizing plant has also been built at Seneca, Mo. The material will be marketed under the trade name "Valencia" pumice.

The **Chase Brass & Copper Company**, of Waterbury, Conn., has taken space in the Lakeside Exhibition Hall of the Great Lakes Exposition.

The company is planning reproducing manufacturing processes of brass and copper products from the mine to the finished article. W. A. Amelung, manager of sales promotion, will be in charge of the exhibit. The Exposition will open on June 27th and will last for 100 days.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

March 25, 1936.

Local business dropped off in February, compared with the previous month but was still far ahead of the same month last year, according to the Chamber of Commerce. At the end of February there were 32,025 persons employed in plants employing 65 or more, a decrease of 30 compared with January but an increase of 3,055 over February last year.

Rumors that the **American Brass Company** had taken over the **Smith & Griggs Manufacturing Company**, or that it is operating the plant for the owners of that company, were denied by officials of both concerns last month. The concern was founded in 1864 by **John E. Smith** and **Henry C. Griggs**. Notable figures in it since then have been the late **A. S.** and **H. S. Chase** and **Irving H.** and **Fred S. Chase**, also officials of the **Chase Companies** and the **Waterbury Clock Company**. **J. R.** and **A. J. Smith**, **R. F. Griggs** and **Julius Maltby**. Its present officials are **David C. Griggs**, president, and **Robert Eggleton**, secretary and treasurer. It is capitalized at $400,000. It manufactures brass and metal goods, buckles, clasps, automobile and building hardware and novelties and uses material such as is made by the **American Brass Company**. Recently its activity has greatly decreased.

The **City Board of Aldermen** has voted to compromise its tax claim against the **Beardsley & Wolcott Company** provided the concern perfects its reorganization and continues operation. Its total claim is for $67,000, including $17,000 in interest. The **U. S. District Court** refused to allow the interest claim but the **City** appealed to the **Court of Appeals** and won out. However, **W. A. Tobler**, representing the reorganizers, said if the entire payment were insisted upon, reorganization would be delayed and might not go through. He offered to compromise the entire claim for $50,000 to be paid April 15 and the **City** accepted.

Warren F. Kaynor, president of the **Waterbury Button Company** has written a plea to the **Interstate Commerce Commission** to give the New Haven railroad a "needed break." The present ICC investigation of the road drew criticism from him, he saying that while the investigation is going on the transportation of the region is suffering.

Directors of the **Bristol Company** have voted to reduce the capital stock of the organization from $2,500,000 consisting of 100,000 shares of a par value of $25 each, to $2,000,000, consisting of the same number of shares of a par value of $20 each. The principal directors are **Herman Koster, Howard Bristol, Samuel Bristol, William H. Faith, Lawrence Bean** and **Carlton Bristol.**

Isaac Chase, a junk dealer of New Haven, was arrested last month because 125 pounds of copper was found in his possession which experts of the **Chase Companies, Inc.** examined and said had been exclusively manufactured for their concern. The prosecution, however, was unable to prove that the copper had been stolen, but the dealer was fined $10 and costs for his failure to register as a junk dealer as required under a recently enacted state law.—W. R. B.

Connecticut Notes

March 25, 1936.

HARTFORD — The **Connecticut Chamber of Commerce** reports that Connecticut industries had an average gain of 26.7 per cent in 1935 over the previous year.

NEW BRITAIN—Landers, Frary & Clark reelected all directors last month and the directors reelected **Charles F. Smith**, chairman of the board, **Arthur G. Kimball**, president, and the other officers. **Mr. Smith** will be 75 this year, has served 55 years with the company and 18 years as chairman of the board. He started as a salesman, became assistant secretary in 1887, treasurer in 1895 and president in 1900 when he was not yet 40.

The **American Hardware Corporation** has declared a quarterly dividend of 25 cents a share, payable April 1.

The **Stanley Works** are producing a new item, described as airplane mooring harpoons, a device for anchoring airplanes in a field where there are no hangars. These anchors are light and compact but strong enough to stand a strain of 1,000 pounds.

MERIDEN — President **Evarts C. Stevens** of the **International Silver Company** explains that the loss in earnings suffered by the company last year was due largely to the increased cost of silver purchased early in the year and the drastic reduction in the market price toward the end of the year. The report showed that the Canadian affiliate earned a profit of $10,429, which was included in the profit and loss statement.

Henry H. Stockder, general manager of the local plant of the **Silver Company**, retired last month after completing 50 years service. He was presented with a 50-year service gold pin containing a diamond chip.

The **Federal Trade Commission** has brought charges of unfair methods of competition against the **International Silver Company.** The charge is that the company describes its "Anchor" and "Star" products as retailing at $50 a set but allows retailers two discounts which makes the net cost to the retailers, $15 a set and permits them to advertise and sell these products at what are called "half-price sales." This creates an erroneous impression, the commission holds, that the true selling price is $50 a set when actually it is much lower.

ANSONIA — The **American Brass Company** has brought suit against **Aurelio** and **Anna Attruia** of Seymour because of a dispute over the boundary between its property and that of the defendants. It asserts it has a right of way to a dam on its own property and that the defendants have blocked the right of way.

TORRINGTON — The **Torrington Company** has declared the regular quarterly dividend of $1 a share payable April 1. **A. W. Burg** and **Howard J. Castle** have been elected directors to fill vacancies caused by deaths.

STAMFORD—The **Yale & Towne Manufacturing Company** has declared the regular quarterly dividend of 15 cents a share, payable April 1.

SOUTHINGTON — **Edward L. Barker** has resigned as superintendent of the **Southington Hardware Company** after 16 years service. **John A. Butler**, who has been with the company for 48 years, has been appointed superintendent.—W. R. B.

Middle Atlantic States

Utica, N. Y.

March 25, 1936.

Foundry and metal trades in Central New York show increased business activity while textile and clothing groups are showing decreases according to a recent report of the Industrial Association which charts working hours and employment figures for this area.

A delegation of four emissaries of the Soviet government inspected the **Brunner Manufacturing Company** plant here early in March. The commission headed by **Z. R. Svirsky** came without the leader due to his illness. **V. P. Barmin** led the delegation. **George Brunner**, head of the Utica company, was marooned in Pittsburgh during the flood.

Metal orders in the immediate Utica area are better than they were a year ago. **Emil Steinhorst & Sons Inc.**, Utica, makers of electric milk coolers, report they have more orders thus far than they had in the first six months of 1935. The concern is now building nine different sizes from two to sixteen 10 gallon can capacity.

The **H. J. Brandeles Corporation**, Utica, contracting engineers, have several large contracts in progress now including heating, ventilating, cold storage and service connections for the new addition to Auburn State Prison. The concern has a contract at the Broadacres Sanitorium, Utica.

Late in February **John J. Frey**, president of the metal trades department, American Federation of Labor was scheduled to speak before the Remington-Rand workers at a dinner at Ilion. Civic organizations in Ilion and Central New York towns have been asked by the **Ilion Kiwanis Club** to aid in increasing the sale of Rand products in this area so as to encourage factory officials to continue the operation of the two Ilion plants.

During the recent Northern New York storm the payroll truck of the **General Cable Corporation** became stranded in drifts between Utica and Rome but was finally dug out in time so that the men at the plant received their pay.

The newly organized **Rome Cable Corporation** has elected these officers: President, **H. Y. Dyett**; vice president and treasurer, **H. W. Barnard**; vice president and sales manager, **C. A. Scott**; comptroller and assistant treasurer, **V. W. Collins**; secretary, **A. D. R. Fraser**.

The former property of the **Rome Company**, one time the **Rome Metallic Bedstead Company**, will be used by the new organization.—**E. K. B.**

Newark, N. J.

March 25, 1936

Westinghouse Electric & Manufacturing Company, whose chain includes plants in Newark, Bloomfield and Trenton, celebrates its golden jubilee this year with the issue of an annual report showing net income for 1935 of $4.49 a share on the combined common and preferred stock, compared with only $2.37 on the preferred in 1934. The net income was $11,983,380 compared with $189,562 in 1934. This was the highest income in six years.

Automatic Telephone Dialer, Inc., Newark, has purchased a plant on Coit Street for the manufacture of automatic telephone dialers. The property was purchased from the **Electro Gear Corporation** of New York City.

General creditors of **August Goertz & Company**, Newark, manufacturers of metal novelties, will receive a first dividend of 20 per cent according to Vice Chancellor Buchanan. In the meantime the receivers are to continue their efforts to sell the real estate. The last accounting of the receivers showed receipts of $80,818.17 and disbursements of $20,417.47 leaving more than $60,000.

Phelps Dodge Copper Products Company, Elizabeth, will construct an addition to the plant to cost $37,000.

Frederick G. Enslin, who retired three years ago after 50 years in the service of the **John A. Roebling's Sons Company**, Trenton, N. J., died Feburary 22 at his home in Trenton. He was 67 years of age. He began work for the firm when he was 14 years old. Me was foreman of the wire shop whe he retired, and tested wire for many famous big bridges. He is survived by his wife and two daughters. Burial was in Trenton.—**C. A. L.**

Trenton, N. J.

March 25, 1936.

A suit has been instituted in the Court of Chancery to vacate a contract which the **Roller Bearing Company of America** of Trenton, allegedly made to purchase a majority of its common stock from former officers of the firm. Vice Chancellor Bigelow directed the company to show cause why it should not be restrained from making any further payments out of corporate funds on account of the contract. A stockholder charged that in June, 1933, the corporation without notice to him and without calling any general meeting of stockholders agreed to buy for about $40,000 the stock of three officials. The stock, it is said, constitutes about 55 per cent of that issued. It is charged in the bill of complaint, that the stock the company contracted to get was purchased not for any legitimate corporate purpose or for mutual benefit of all stockholders, but for the sole purpose of retiring the stock held by three other stockholders. It is said that the company has lost between $20,000 and $30,000 a year for the last three years.

Dr. and Mrs. Edward F. Northrup, of Princeton, recently entertained in honor of his 70th birthday. He is vice president and technical adviser of the **Ajax Electrothermic Corporation**, of Trenton.—**C. A. L.**

Middle Western States

Detroit, Mich.

March 25, 1936.

Industrial conditions show a steady improvement all through this Great Lakes area. Motor car production is particularly outstanding. This, of course, has carried along the plants that specialize in motor car parts and accessories. Practically all of them are now working to capacity which means 24-hour operations. Steady production also is maintained at plants manufacturing refrigerator units. Demands for this modern equipment shows no signs of slowing up.

Strange as it might seem, the employment situation is not all that might be desired. With production well up to peak records there are more idle workers than one might suppose. Under present methods it seems impossible to expect absorption of surplus labor, such as prevailed way back in 1929. This is due, of course, to the introduction of new methods, new machinery and other ways of lowering costs and at the same time producing better products. Skilled mechanics are in demand, but unskilled workers are experiencing extreme difficulty in selling their services.

More activity is indicated in the production of plumbing and steamfitting supplies. Manufacturing jewelers, however, are not yet out of the slump that seems to have continued almost for ages. Nevertheless, those interested in this industry are anticipating an early break for the better.

An active demand for precision screw machine products has necessitated the enlargement of the present plant of the **Wayne Screw Products Company**, 521 St. Jean Avenue. A modern steel and

brick addition is now being hurried to completion. This structure will double the size of the plant and house 40 more screw machines to be used for secondary and finishing operations. This plant was established in 1932 by **Albert C. Germer** and **John J. Corin.** About 30 per cent of the production, according to **Mr. Germer,** is absorbed by the automobile industry.

The **Michigan Valve and Foundry Corporation** has recently been incorporated in Detroit. The capital stock is given as $1,000.

The **Champion Spark Plug Company,** it is announced, has signed a contract to furnish spark plugs to all automobile units of the Chrysler Corporation, both for original equipment and for replacement stocks.—F. J. H.

Pacific States

Los Angeles, Cal.

March 25, 1936.

The **Menasco Manufacturing Company** have received an order from London for 100 motors, to cost $150,000. **A. S. Menasco** is president. The plant will be enlarged and more men employed.

The **Norton & Norton Electric Company** at 1375 North Broadway, will build a $25,000 addition to their plant and install a lot of special machinery. They have also built a large warehouse at Pasadena Ave. and Avenue 35. A large export business is being worked up.

Another larger plant soon to be opened here, is that of the **Federated Metals Corporation,** a subsidiary of the **American Smelting & Refining Company,** one of the largest manufacturers of non-ferrous metals in the country. They have bought a tract at 26th St. and Indiana Ave.; will build a $1,000,000 plant. There will be two large buildings, one for storage and preparation of type metals, babbitt ingot brass and copper, pig pipe, sheet, bends, traps, etc., also tin, solder, aluminum, zinc and alloy metals of zinc chloride, zinc sulphate, copper sulphate, etc.

The other large building will be to prepare secondary non-ferrous metals, to supply them for the smelters and refineries at, Tacoma, Wash. and Perth Amboy, N. J. and to be shippers from the harbor here all over the world. The payroll will amount to $100,000 a year. The plant later will be doubled in size. Also it is foreseen that if general business continues on the upgrade, there will be built here a large smelting and refinery plant.

Ivan Reitler and **Edgar Newhouse, Jr.,** of New York City, officers of the main concern, were here to arrange for the building of the plant and bought the site. **Victor B. Seidel,** engineer for the company, will supervise the building of the plant. **Jack Schwartz** of the Seattle office will be general manager and **Seymour Swarts** will be local manager.

The **Metallizing Company of America** have moved their plant to 1351 East 17th St. to enlarge their facilities for manufacturing spray liquid metal to prevent corrosion, which is done by a combination welding torch and paint spray gun. **Robert A. Kunkler** is at the head of the concern.

The **Union Die Casting Company** have greatly enlarged their plant at 2269 East 51 St., making die castings. They are also making plumbing and household appliances.

The **Miller Conditionaire Company** at 1138 South Broadway, have established a plant at 1134 South Main St. to make air condition equipment.

—H. S.

Metal Market Review

March 25, 1936.

Copper was unchanged and steady at 9.25c per lb. for electrolytic. Trading during the first week was quiet, about 8,000 tons. During the second week foreign buying became active and there was some talk of the price going to 9.50, following the lead of the one or two producers, who set that figure last month. Sales, however, were about the same level—8,000 tons. The next week, sales were about 7,500 tons.

Although the total was not startling, consumption of copper in the country is averaging close to 50,000 tons a month and substantial improvement is looked for as soon as outdoor work can be resumed.

Zinc was also firm, 4.90c per lb., E. St. Louis. The market was quiet but steady throughout the whole period up to the time of writing. Statistics showed that the position of zinc improved in February. While sales were not extraordinary, 4,300 tons of prime western were shipped to consumers during the last week of this report, indicating that consumption is proceeding at a good rate.

The **Tin** market varied although the price range was narrow. Beginning the month at about 48c per lb. for Straits, the metal moved as high as 48.875 and as low as 47.875. Trading in the first week was slow, in the second week, more active and then, slow again. In London control plans are under discussion.

Lead was unmoved, 4.45c per lb. E. St. Louis, to which it had advanced during the last few days of February. Buying was brisk mounting to 8,500 tons in the first week, 10,250 in the second, and while it dropped to about 6,350 tons in the third, this tapering off was expected in view of the heavy sales during the previous four weeks. Consumption is increasing and approaching the level of 40,000 tons per month.

Aluminum was unchanged at 19-22 cents with most of the business at about 20 cents per pound.

Nickel was also unchanged, 35 cents per pound for electrolytic.

Silver seems to have decided to take up a permanent home at 44.75 cents per troy ounce. Of course, at any time a change of plans in Washington will result in eviction, the level of its new domicile depending upon the new plans. Sales in London were quiet but firmed a little during the latter part of the month. Otherwise no news.

Platinum was quiet at $32-33 per ounce.

Scrap Metals reacted a little when two copper refiners buying scrap on a 9.50 electrolytic basis reduced their bids 5 to 15 points on different grades. Offerings were a little better during the first week, but were light immediately thereafter.

Demand for ingot brass began slowly but some rather sizeable orders were placed later in the month. Aluminum ingots were fairly steady throughout.

The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for the month of February, 1936, amounted to a total of 5,645 tons.

On March 1, unfilled orders for brass and bronze ingots and billets on the books of the members amounted to a total of 19,761 net tons.

Average prices per pound received by its membership on Commercial Grades of six principal mixtures of Ingot Brass during the twenty-eight day period ending March 20, were:

80-10-10 (½ Imp.)	10.799c
78% Metal	8.503c
81% Metal	8.755c
83% Metal	9.018c
85-5-5-5	9.277c
No. 1 Yellow Brass	7.541c

Wrought Metals followed the general trend of the month, which was slightly reactionary. Business in the Connecticut Valley fell off compared with January although it was ahead of February, 1935. Sales of wrought metals in the Metropolitan District were reported to be even with February and about 20% ahead of March, 1935.

Metal Prices, March 30, 1936

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.375, Electrolytic, 9.25, Casting, 8.95.
Zinc: Prime Western, 4.90. Brass Special, 5.00.
Tin: Straits 47.20. Pig 99%, 46.50.
Lead: 4.45. **Aluminum,** 19-22. **Antimony,** 13.50.
Nickel: Shot, **36. Elec., 35.**

Quicksilver: Flasks, 75 lbs., $77.00. **Bismuth,** $1.00.
Cadmium, $1.05. **Silver,** Troy oz., official price, N. Y., March 30, 44.75. **Gold:** Oz. Troy, Official U. S .Treasury price, March 30, $35.00. **Scrap Gold,** 6¾c. per pennyweight per karat, dealers' quotation. **Platinum,** oz. Troy, $33.00.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U S. Import Duty	Tax*
No. 1 Yellow Brass	7.75	None	4c. lb.[1]
85-5-5-5	9.50	None	4c. lb.[1]
88-10-2	12.50	None	4c. lb.[1]
80-10-10	11.00	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	9.75	None	4c. lb.[1]
Aluminum Bronze	13.75	None	4c. lb.[2]
Monel Metal Shot or Block	28	25% a.v.	None
Nickel Silver (12% Ni)	11.50	20% a.v.	4c. lb.[1]
Nickel Silver (15% Ni)	15.00	20% a.v.	4c. lb.[1]
No. 12 Aluminum	16.50-20	4c. lb.	None
Manganese Copper, Grade A (30%)	18-23	25% a.v.	3c. lb.[1]
Phosphor Copper, 10%	11.25-14	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	13.25-15	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	18.30	45% a.v.	4c. lb.[1]
Phosphor Tin, no guarantee	61-75	None	None
Iridium Platinum, 5%	$34-35	None	None
Iridium Platinum, 10%	$35-36	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	7¼ to 7½	Free	4c. per pound on copper content
Light copper	6¼ to 6½	Free	
Heavy yellow brass	4½ to 4¾	Free	
Light brass	3¾ to 4	Free	
No. 1 composition	6¼	Free	
Composition turnings	6⅛	Free	
Heavy soft lead	3.90 to 4	2⅛c.lb	
Old zinc	2.85 to 3.00	1½c.lb.	
New zinc clips	3¾	1½c.lb.	
Aluminum clips (new, soft)	14 to 14.25	4c.lb.	
Scrap aluminum, cast	12.25 to 12.50	4c.lb.	
Aluminum borings—turnings	6½ to 6¾	4c.lb.	None.
No. 1 pewter	29 to 30	Free	
Electrotype	4 to 4¼	2⅛c.lb.*	
Nickel anodes	29½ to 31	10%	
Nickel clips, new	32 to 33	10%	
Monel scrap	11 to 19	10%a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since January 13, 1936. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16½c.	2½c. lb.
Bare wire, soft, less than carloads	13 c.	25% a. v.
Seamless tubing	17 c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23⅞c.	10% Quality	26¾c.
15% Quality	26 c.	15% Quality	31⅛c.
18% Quality	27¼c.	18% Quality	34⅜c.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red 80%	Comm'l. Bronze	Duty	
Sheet	14⅝c.	15½c.	16⅜	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	15⅛c.	16 c.	16⅞	25%	
Rod	13⅛c.	16 c.	16¾	4c. lb.	
Angles, channels	22⅝c.	23¼c.	24⅜	12c. lb.	
Seamless tubing	16⅞c.	17½c.	18⅜	8c. lb.	
Open seam tubing	22⅝c.	23¼c.	24⅜	20% a.v.	

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	16¾c.
Muntz or Yellow Rectangular and other sheathing	17⅞c.
Muntz or Yellow Metal Rod	14¼c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. 32.80
Aluminum coils, 24 ga., base price, ton lots, per lb. 30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods .....49c. Cold Rolled Sheet .....53c.
Hot Rolled Rods .....44c. Standard Sheet .....48c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)...34 Standard Sheets (base) 38
Cold Drawn Rods (base)..39 Cold Rolled Sheets (base) 43

SILVER SHEET

Rolled sterling silver (March 30) 47c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	8.00	2⅛c. lb.
Cut Lead Sheet (base price)	8.25	2⅛c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. over .....15c. above N. Y. pig tin price
100 to 500 lbs. .....17c. above N. Y. pig tin price
Up to 100 lbs. .....25c. above N. Y. pig tin price
Up to 100 lbs. .....25c. above N. Y. pig tin price

Supply Prices on page 160.

Supply Prices, March 30, 1936

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast	16½c. per lb.	**Nickel:** 90-92%	.45 per lb.
Electrolytic, full size, 14¼c. cut to size	14¼c. per lb.	95-97%	.46 per lb.
Rolled oval, straight, 14¾c.; curved,	15¾c. per lb.	99%+cast, 47c.; rolled, depolarized, 48.	
Brass: Cast	17 c. per lb.	**Silver:** Rolled silver anodes .999 fine were quoted March 30, from 48c. per Troy ounce upward, depending on quantity.	
Zinc: Cast	10⅛c. per lb.		

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

		Any Quantity			
4 to 6	Under ½,	$5.00	½-1, $4.85	1 to 3.	$4.75
1½ to 4	"	5.55	" 5.40	"	5.35
1 to ½	"	5.85	" 5.70	"	5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16" 20 ply 84/92 Unbleached	$71.13
14" 20 ply 84/92 Unbleached	54.58
12" 20 ply 84/92 Unbleached	41.09
16" 20 ply 80/92 Unbleached	59.37
14" 20 ply 80/92 Unbleached	45.64
12" 20 ply 80/92 Unbleached	34.45
16" 20 ply 64/68 Unbleached	51.26
14" 20 ply 64/68 Unbleached	39.47
12" 20 ply 64/68 Unbleached	29.86
⅜" Sewed Buffs, per lb., bleached or unbleached	48c. to 1.12

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.10-.15
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 400 or 100 lb. drums		.16¾
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.09½-.12
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.03½
Powdered, barrels	lb.	.0340-.0365
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0245-.0295
Cadmium oxide, 50 to 1,000 lbs.	lb.	.85
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.15½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
*Gold Cyanide, Potassium		$15.45
*Gold Cyanide, Sodium		$17.10
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) Pure, drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	18-.22
Salts, single, 425 lb. bbls.	lb.	.13½-.14½
Salts, double, 425 lb. bbls.	lb.	.13½-.14½
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08⅜
Potassium—Bichromate, casks (crystals)	lb.	.09
Carbonate, 96-98%	lb.	.07⅜
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.38
Cyanide, 100 oz. lots	oz.	.45¾-.50
Nitrate, 100 ounce lots	oz.	.32¾
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.15-3.30
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.0350
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.32-.35
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
*Tin Chloride, 100 lb. kegs	lb.	.37
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.37
Chloride, drums, bbls.	lb.	.07½-.10
Sulphate, bbls.	lb.	.028-.037

*Subject to fluctuations in metal prices.